Library

EDITORIAL

INDEX for the sixth volume of WESTERN ENGINEERING is now ready for distribution and will be mailed to all those who desire to have their back numbers bound. Drop a line to the circulation manager and the index will be sent by return mail.

GUESSING contests are not usually a feature of the award of an engineering contract, the elements of chance being sufficient in themselves to satisfy the most inveterate gambler. Recently, however, a contract for furnishing a car of powder to the Los Angeles aqueduct was to be awarded. Three firms bid exactly the same amount. Mr. William Mulholland, chief engineer for the aqueduct, wrote a number and placed it in a sealed envelope. Each bidder then guessed a number and the man who guessed the nearest got the contract. Could anything be simpler?

THINGS equal to the same thing are equal to each other. The way of the transgressor is hard, and so is that of the jitney-bus driver. Therefore, jitney-bus drivers logically must be transgressors; at least the public service corporations seem to be making some progress in impressing this viewpoint upon city councils. Restrictive ordinances regulating to a greater or less degree the operation of the jitney have been passed, or are being passed, by cities where the jitney has been thriving. Indemnity bonds and other safeguards are the usual thing, while Oakland and Bakersfield, California, have gone further through the adoption of ordinances forbidding the operation of jitneys paralleling street-car lines. The constitutionality of these latter ordinances is to be tested in the courts, but in the meantime many of the drivers, feeling financially unequal to the fight, are giving up the struggle. Incidentally, a 50-per cent increase in the price of gasoline has been no small factor in accomplishing this result.

DOES it always pay to award a contract to the lowest bidder? Sometimes, but not always. If all buying were done by price considerations only, a great many highly-paid purchasing agents in the United States would be looking for jobs and $10-a-week clerks would be attempting to fill their shoes. A contract for the construction of buildings for the State Normal School in Fresno, California, was recently awarded to a bidder of little experience and slender resources at a price that the State engineer is reported to have said was $30,000 too low to admit of a fair profit. Events took the usual course in such cases, having as a finale the customary creditors' meeting. The claims presented were far greater than the remaining resources of the contractor, although he had already received a considerable sum from the State based upon monthly estimates of progress. To make matters even more interesting, the surety company which had assumed the bond obligation for the contractor has recently gone into the hands of a receiver, so that the State, in order to recover, may be compelled to sue the individual stockholders. Here lies a lesson which all who read may learn.

The Case of the Marin Water & Power Company

Last month in these columns we chronicled the results obtained by two public utilities which succeeded in establishing their claims before the California Railroad Commission by fighting to a finish. One of these claims was put through by a threat to appeal to the State Supreme Court. This, however, does not seem to have established a precedent. In 1914 the Marin municipal water district applied to the Commission to make a valuation of the property owned by the Marin Water & Power Company. This valuation was to be made for condemnation purposes under the powers recently granted to the Commission by constitutional amendment. The Commission rendered a decision on April 9, 1915, which makes interesting reading. In general, the decision discusses the testimony prepared on both sides as to the value of the physical structures, real-estate, water-rights, and rights-of-way owned by the company. At this point, however, a value of $1,200,150 is placed upon the entire property of the company. How this conclusion is reached, or on what it is based, is shrouded in mystery. The decision fails to disclose any details as to what values were placed by the Commission upon any individual part of the property. It is true that the valuation determined by the Commission's engineers for the physical structures is given, but no statement is made that it was accepted by the Commission. The reader in search of information could draw no conclusion other than that the valuation set by the Commission is a purely arbitrary figure. A possible explanation for this reticence may be found in the general attitude of the Commission with regard to water-right valuation. It will be remembered that the first and only time that the Commission has pronounced upon water-right values was in the Glendale rate case. Since that time valuations fixed by the Commission in cases involving water-rights have been characterized by vagueness similar to that shown in the present instance.

The Marin company appealed the case, and questioned the power of the Commission to fix a value for condemnation purposes. It claimed further that the value fixed was too low, and that the Commission should have made

Generated on 2024-09-30 01:14 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

an itemized valuation of all the property. The State Supreme Court sustained the Commission on all points and the company must now hand over its property without further delay unless appeal is taken to the United States Supreme Court. We hope that the company will take this appeal in the interests of all of the public service corporations in California. There are undoubtedly many reasons why it is convenient to have the Commission make valuations for condemnation purposes, provided that the Commission assumes a judicial attitude instead of that of an advocate for either side in the controversy. We do not consider it fair, on the other hand, to hand down decisions in such form as to render them impossible of review and analysis. If the Commission regards itself the protector of the municipalities and consumers as against the corporations, it should at least be willing, in the interests of justice, to lay its cards upon the table.

The Federal Leasing Bill

The long expected leasing bill, providing for the development of public lands containing coal, oil, gas, phosphates, and mineral fertilizers, has passed the House of Representatives. The bill provides in effect that in the case of coal land no individual may acquire more than 2560 acres before commencing development. Railroads are permitted to produce coal for their own use only, but are to pay therefor a royalty of not less than 2 cents per ton. Special concessions are made regarding domestic use by homesteaders and municipalities. Provisions similar to those for coal are made for phosphates and other mineral fertilizers. Leases for oil and gas-lands are authorized for tracts ranging in size from 160 to 640 acres. Twenty-year leases are to be the rule with the privilege of a ten-year renewal. Lessees are to pay therefor an annual rental of not less than $1 per acre and a royalty of not less than one-tenth of the gross production. Operators on lands affected by previous withdrawal orders and who had filed their claims prior to January 3, 1910, the date of the Congressional withdrawal, are to be given preference in the granting of leases, provided that they can show evidence of good faith in the form of definite efforts to develop their claims. The presence of a well or evidence that claims were being worked on January 1, 1914, is regarded as a proof of good faith. Alaskan coal lands and oil lands situated in the Naval reserves are not affected by the bill. Control of leases is vested in the Secretary of the Interior. The revenue received from lessees is to be divided equally between the Federal and State governments. The Federal government's share is to be expended for reclamation projects and that of the State for highway and educational purposes. It is not absolutely clear whether or not these amounts are to be expended on reclamation projects within the States where they were collected as provided in the original Reclamation Act with regard to the revenue from public-land sales. This rule has been "honored more in the breach than the observance," and has been a source of much contention between engineers in the Service and pork-barrel politicians.

Here in California chief interest lies in the projects relating to the oil lands. The oil operators on withdrawn lands, while rejoicing over a part victory, are frankly dissatisfied with the leasing system. They had hoped to secure direct ownership, and are now taking steps to effect changes in the bill before it becomes a law. Assuming that the principles of conservation will be secured through the regulation of line drilling and the exercise of due skill in shutting off infiltrating water, one important ground for objection to the bill is the grouping of so many different classes of operator in the same class. Apparently no effort has been made to separate the sheep and the goats. The man who entered upon withdrawn land after the Presidential but before the Congressional withdrawal, and the man who merely posted a notice before the Congressional withdrawal and then commenced development work at some time prior to January 1, 1914, are both treated alike. Some of these men observed strictly both the letter and the spirit of the law; others failed to follow the letter of the law in all particulars, but observed the ordinary customs as they obtained in the oilfields, which, up to this time, have been recognized by the General Land Office; while others have acted in defiance of both law and custom. Virtue is its own reward and the consciousness of virtue seems to be the only recognition that will be accorded to the 'good' oil-man by the public-land leasing bill.

If our conception of the feeling that exists in Washington at present is correct, no bill can be passed that will provide for the granting of patents to all operators having producing wells on the property that they now occupy, nor would we be in favor of such legislation. Congress may decide to permit the issuance of patents to operators that may be grouped in the first of the classes mentioned. In general, however, as we have frequently stated, the leasing system for public mineral lands is here to stay, and the advocates of the old order of things may just as well commence to become accustomed to the new conditions now as any time. The advisability of charging more than a nominal royalty to cover administrative costs is a debatable question. That the Federal government should retain control over some of the natural resources of this country in the interests of conservation is one thing; that it should try to reap a profit from them is another thing. We are by no means satisfied that the diversion to the reclamation projects of the Government's share of the income thus produced is a wise provision. What the settlers on reclamation projects need is not so much more loans without interest to cover part of the cost of the work, as means for adequately financing the entire cost of developing raw desert lands. If it were proposed to tax the agricultural resources of the country to develop the oil industry, a howl would proceed from the farmer that would reach the high heavens. Why then should the oil industry be taxed to help develop the Nation's agricultural resources?

Generated on 2024-09-30 01:12 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

REVIEW OF THE MONTH

WINTER, and the attendant storms as the causes, are producing the customary effects. Land is inundated, property is being destroyed, rail-traffic over the Sierras is greatly interrupted, and in some cases even temporarily suspended. Southern California and Arizona have been particularly unfortunate. Shifting channels of the torrential streams in that section have washed out bridges, flooded orchards, and even threatened many homes in low-lying areas. In the San Joaquin valley-district a 60-mile gale swept through the Midway and McKittrick oilfields, wrecking about four hundred derricks and many other structures. We presume that the annual flood recurrence will carry in its wake the usual crop of flood-control schemes, which will be agitated vociferously for a few weeks and then die a natural death with the advent of the flowers that bloom in the spring. Some day property owners, tax payers, and other citizens in the storm-affected area, will ponder over the meaning of the word 'preparedness' which is agitating the country today. It may be applied to many things other than against invasion by a hostile army. Preparedness against invasion by destructive floods and storms would be a safe and sane policy that even the most ardent pacifist could well afford to advocate. It is the fatal lack of co-operation and co-ordination of effort that is militating most against the adoption of a definite program for flood-control. Sectional differences are the rock upon which the cause splits. Some day our education will have progressed to the point where the good of the community will prevail against the selfishness of the individual.

THE severe winter storms have accomplished one thing, however, and that is to demonstrate conclusively the high quality of the State's new concrete highways. It has been reported that in many areas, sections of the State highway were under running water for many hours, and yet, when the flood subsided, they were in practically as good condition as before. Such slight damage as has been reported was due mainly to uncompleted construction and the structures can be repaired without much expense.

IT is not inappropriate that the Inland Waterways Association of California should hold its annual meeting in San Francisco on February 21 and 22. At that time it seems likely that there will be many inland waterways to discuss and of no inconsiderable magnitude. On the program for consideration is included the Newlands-Broussard bill, and the proposed plan for a State and a National department of public works. In California, the welfare of the people depends more upon the various uses of water than in any other State in the Union. It is also true that the public is beginning to realize more and more that irrigation, power-development, flood-control, and navigation are closely inter-related, and that the problems incident to all of these should be considered as a whole. The conditions arising from the loss of life and property by reason of the usual crop of winter storms will offer food for reflection. It is to be hoped that at the forthcoming meeting a nucleus at least may be formed for the ultimate consummation of a definite program that may some day prevent the annual waste and losses that follow in the wake of winter floods in many districts throughout the country.

EVEN in these days the rain-maker is not without honor, save perhaps in San Diego. Last month we noted in these columns that the City Council of San Diego had entered into a contract with Mr. C. M. Hatfield to fill the Morena reservoir. The party of the second part was to receive no pay should he fail to deliver the goods. Further light has been thrown upon this interesting transaction, in that it appears that the contract was verbal only. The city attorney has refused to draw up an agreement in writing until he is furnished with sufficient information to enable him to determine whether or not the run-off into the reservoir is the result of the occult sciences practised by the rain-maker. What must make the present uncertain situation particularly annoying to the magician is that the storms have already come near filling the reservoirs in question and are likely to fill them completely before an agreeemnt can be consummated. One member of the council has suggested that in case Mr. Hatfield should win his bet, other towns in southern California should be invited to contribute to his reward. This, however, might make the city of San Diego liable for the damage caused by an excess of Mr. Hatfield's prowess. If it were even hinted, perhaps, that the recent floods had been caused by the necromancy of the San Diego water department's spiritual adviser, would not the city be liable for damage, if, through an excess of zeal, the Overland mail should fail to arrive by reason of Sacramento River floods?

THE Californian system of payment for street improvements is known to be hopelessly crude, in fact it is doubtful whether even a baker's dozen of lawyers could aggregate sufficient knowledge of the devious windings of the law with its mass of contradictions to be able to guarantee to a contractor that he could finish a job without getting into legal difficulties. A short time

Generated on 2024-09-30 01:16 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

ago the city of San Jose opened bids for the construction of several small pieces of pavement. The price quoted seemed unusually high, but the lowest bidder, when called upon to explain, stated that his figures were subject to a discount of 50-per cent if the property owners paid his bill without his having to institute court proceedings. Here is an opportunity for some legislator, or group of legislators, who are big enough to throw all the laws, precedents, decisions, and statistics pertaining to street work in the rag-bag and substitute therefor a law that will be safe, sane, rational, and at the same time not involve street contractors in such a tangle that they feel it necessary to protect themselves by quoting such prices.

HERE is another instance of legal circumlocution that serves further to clog the wheels of progress. The Board of Supervisors of Butte county, California, passed an ordinance providing for the construction of a hall of records. In due course, bids were received and the contract awarded. Those who were opposed to the construction of the building, circulated a petition calling for a referendum election and obtained the legal number of signatures. The board of supervisors, as a counter move, declined to call the election on the ground that arranging for the construction of the building was an administrative, not a legislative act, and was therefore not subject to the referendum. The proponents of the measure brought the matter under a change of venue before the Superior Court of Solano county, which decided against the Board. The case will undoubtedly be appealed. Should the decision be sustained by the Supreme Court, it will thereby become impracticable to open bids for any public work until a sufficient time has elapsed after the passage of the first ordinance to give assurance that the referendum will not be invoked against it. The people in this case seem to be ruling in accordance with the popular conception of a regiment of State militia—all officers and no privates.

IRRIGATION in the Imperial valley was placed on a better financial footing as the result of a recent agreement between representatives of the new Imperial irrigation district, the Southern Pacific railroad, and other creditors of the California Development Company. By the terms of this agreement the district acquires the entire irrigation system and other property of the California Development Company, including about $100,000 in cash now in charge of the receiver. In consideration of this, the district turns over its entire bond issue of $3,000,000 to the Southern Pacific Company, which in its turn relinquishes all claims against the California Development Company and agrees to settle all other claims against the company.

AT a meeting held at Fresno on January 20 last, irrigators took steps toward securing Federal aid in storing and distributing the waters of Kings river. The situation in the Kings River delta is typical of that in the vicinity of most other Californian streams. At first there was water enough for all, the earlier disputes having occurred principally over priority of rights. After a dreary course of litigation, these rights were settled with the usual result, most of the smaller ditch companies being put out of business and consolidation into a few large companies effected. As the area placed under irrigation became greater, the demand for water increased proportionately until the present time when only during years of excess rainfall are all water-users satisfied. In the meantime there has been little if any improvement in the canal system. Temporary weirs and unlined earth ditches, as representative of the condition that existed many years ago are still in vogue, while during every flood season large quantities of excess water are permitted to escape, flooding the lowlands and destroying property. Some years ago Government engineers made an investigation of the Kings River water-shed and published a report on the number and location of feasible reservoir sites. While the first cost of constructing these reservoirs would be large, nevertheless the benefits to be derived directly and indirectly would be such as to indicate that such an expenditure will be entirely justifiable. Here is a chance for constructive conservation.

CALIFORNIAN oil production during 1915 varied between 240,000 and 250,000 barrels per day, diminishing slightly toward the close of the year. Shipments, on the other hand, increased from the low point that obtained during the first few months of the year to about 270,000 barrels per day, which was about the average consumption before commencement of the War. For the last two or three months shipments have exceeded production by about a million barrels per month. Stocks, therefore, have been diminished from 58,000,000 to 56,000,000 barrels. Field operations show a material falling-off, the average number of drilling wells for the year having been reduced to 145 as compared to 222 in 1914 and about 600 during the boom period of 1910. The improvement in the market situation during December of last year increased the number of drilling wells to 172. Conservative operators will prevent any wholesale resumption of drilling operations, we hope, at least until such time as the producer may receive a price for crude oil that will return him a fair profit. The situation, as a whole, is greatly improved as compared to that of January, 1915. Decreased stocks and consumption on one hand, with increased shipments and consequent better prices on the other, combined with the conservative management that obtains in most of the companies, have made the outlook distinctly more favorable. The prospect for Congressional action toward the clearing up of land titles and the probability that some reasonable leasing law may soon go into effect, add much to the feeling of optimism at present pervading oil-producing circles. The efficient work that is being done by the newly created State department in combating the water situation is one of the factors that has contributed much toward the general well-being of the industry.

Generated on 2024-09-30 01:10 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

DISCUSSION

The Contractor as a Human Being

The Editor:

Sir—I note in your October issue of WESTERN ENGINEERING on page 138 an editorial entitled 'The Contractor as a Human Being' in which the Board of Supervisors is severely criticised on account of awarding the bridge contract on a bid that was palpably too low.

I want to state, to those who have read this unjust editorial, that the firm of "reputable contractors," who submitted the low bid for the construction of several small bridges did not find that an error had been made in their computations, but they did find that their total bid was considerably under the lowest possible cost for which the work could be done.

The contractors to whom this article refers did not familiarize themselves with local conditions before submitting their bid, neither did they get in touch with the county engineer who prepared the plans and specifications.

After the bids were opened by the Board of Supervisors, the county engineer's estimate was made known to the bidders and this estimate showed that the firm who had submitted the low bid was $1733.35 below the county engineer's estimate and $1722.50 below the next lowest bidder.

After a conversation between one member of the firm and the writer, the contractors in question decided to ask the Board of Supervisors to return their certified check because they had made an error in their bid. This so-called error was a ruse on the part of the contractors because they found out that the county engineer would not stand for the substitution of Niles gravel instead of broken rock, and unclean ditch sand instead of a clean, well-balanced, sharp sand as specified. In other words, when they found that it would be necessary for them to comply with the plans and specifications to the letter they did not want the work for the amount bid.

Your editorial says "that the permission to withdraw their tender was refused on the ground that the entire matter, so far as the Board was concerned, was purely a matter of business and that the editor did not consider this business."

There is probably no county in the State of California that gives any more information to the bidder through the plans and specifications than Stanislaus county and probably no other county in the State that has a more strict enforcement of the plans and specifications than this county.

Is it good business for a reputable firm of contractors to go around the State of California bidding on contracts when they have no intention of carrying out the intent of the plans and specifications?

Stanislaus county has taken the stand that it proposes to do away with this class of bidders and the irresponsible bidders by gradually eliminating them through the enforcement of the conditions imposed in the advertisement for proposals.

Is it not better business to give the contractor who has an office organization, an overhead expense and a large equipment the opportunity to bid against men who figure the actual cost of the job in accordance with the plans and specifications and then add a legitimate profit instead of having to bid against those who do not figure the job, and submit a bid upon the basis of furnishing material different from that specified?

The old saying that "a sucker is born every minute" has been clearly demonstrated in Stanislaus county. In fact, some of the suckers have taken a second nibble at the hook.

Since July 14, 1914, 17 contracts for county work have been awarded to 13 different contractors. The total contract price is $134,958.14, while the sum of the engineer's estimates was $142,351.95, or $7398.81 higher.

The statement that "the disposition of the Board is no inducement for contractors to bid on work in Stanislaus county" is unjust. We are hoping that it will have the effect of being an inducement for contractors who are competent to figure a job and execute the work in strict accordance with the plans and specifications and complete it with a legitimate profit to their credit to bid on contract work in this county.

Neither the writer nor the Board of Supervisors want to see any contractor lose one cent on public work in Stanislaus county. This is one of the counties in the State where the irresponsible, incompetent bidder is not met with a hearty welcome.

I might add that the reputable firm of contractors to which this editorial refers have made errors in other counties of this State, and in some cases have been relieved of their obligations.

This error germ is prevalent in all parts of the State and United States and it should be handled as Dr. Blue is handling the bubonic plague, namely, by a systematic campaign against those infected with the germ.

E. H. ANNEAR.

Modesto, California, January 14.

[We are glad to publish Mr. Annear's letter, not only because we are always anxious to give an opportunity for expression of views from both sides, but also because the letter itself furnishes the strongest argument in support of our position that the award of contracts at a price too low to permit of good work at a fair profit is

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

both unjust and unwise. If the contractors in question were as irresponsible as indicated in the letter, they should not have been permitted to bid, let alone perform work for the county. We still believe it to be "better business to give the contractor who has an office organization, etc." public contracts, instead of compelling him to waste his time preparing a careful bid only to have the work awarded to some irresponsible contractor who is hoping to be able to 'skin' the specifications in some particular.—EDITOR.]

Inductive—and Other Interference*

Now that the Railroad Commission of the State of California has dismissed the complaints of inductive interference against certain power companies, the writer feels that it is his duty to make certain comments on the report of the Joint Committee on Inductive Interference, which he did not feel it possible to make at an earlier date without doing violence to that high standard of ethics which it is the duty of all engineers to maintain at all hazards, inviolate! No! it would never do to discuss in public any matter before any judicial body and risk the possibility of influencing its decision. (See WESTERN ENGINEERING for November 1915.)

With this brief explanation of why the following comments have been so long withheld from the world, we will proceed to direct your attention to the report of the Joint Committee, and, in passing, it may not be amiss to mention what a Godsend the work of this Committee has been to electrical engineers during the past years of hard times, and also how much the Committee has accomplished in laying the foundation for differences in opinion relating to electrical phenomena and which promise to create a very lucrative field for experts and attorneys perhaps for countless generations to come.

The Committee has been composed largely of representatives of the 'Power Trust,' that grasping monopoly which, we are advised by a writer in the *Daily News*, keeps up the price of electricity by dumping thousands of kilowatts into the Bay, and on this Committee were some of the heaviest weights employed by the 'Telephone Trust,' sometimes referred to as the "Bull Interests." This appellation has caused some misunderstanding of the action of its representatives, but no 'bull-dozing' was allowed on the Committee.

The railroad companies were also represented on the Committee—why, no one seems to understand, but it was probably due to a confusion of the words 'transportation' and 'transposition.' Anyway, they were there—105%, and then some. No one has yet had the courage to state flatly why the 'Great Uplifter,' known as the Editor of WESTERN ENGINEERING, was not invited to this party, and we can only surmise that it was owing to the prospect of his joining the expedition on the *Oscar II* that kept him from soiling the dove's wings by ever getting in the same ten-acre lot with the diversified interests here represented.

The investigation of the Committee has added greatly to the knowledge of electro-magnetic fields and it is now definitely established that while a north pole will attract a south pole, CEDAR HAS NO ATTRACTION FOR REDWOOD.

The words "harmonic" and "neutral" are found repeatedly throughout the report; but do not be deceived, as these are merely catch words to deceive the unwary. There was no harmony, and the "interests" represented are obviously not "neutral," being in part Russian sympathizers, and all of their Poles are armed. Talk about preparedness! Some keep a large supply of gas bums available at all times.

The report is inexcusably incomplete in some respects, a number of references being found to the "form of the wave," but no reference is made to "Stella," unless it be found veiled in indirect allusions to the "legs of the star."

Notwithstanding the large amount of engineering time and money expended, the authors cannot help but express their disappointment at the lack of definite result secured. In this investigation an opportunity was presented for the solution of many vexatious troubles, but the Committee failed utterly, and we do not find any reference to, or research work done in connection with, hunting to its lair the new and pernicious destroyer of communication cable-sheaths—the lead-eating bug. Our railway friends should not have let slip this opportunity for hunting out this creature and holding it up to the scorn of all true electrical engineers; for in this bug we feel there really exists the source of all trouble known as 'electrolysis' heretofore laid to the doors of the electric railway interests. The thousands of dollars spent heretofore in bonding and other means of preventing the destruction of lead-cable covering might have been saved to posterity by the use of a pound of that useful compound that takes its name from a pretty little town in the San Joaquin valley. Or was the powder named 'Buhach' before the town? We forget.

In conclusion, we would urge that in all future investigations the engineer keeps in mind the simple business precept, all together all the time, to kill the bugs and other slugs that eat into our industry, not overlooking the hookworm.

[It is difficult to find words with which to comment upon so notable a literary effort. We like the rôle of the "Great Uplifter," even though in the case to which the authors allude the starting moment seems to have overtaxed the strength of the draw-bar. There were, however, no engineers among the guests on the *Oscar II*, which accounts at least in part for the failure of the enterprise. The aftermath of the descent of the dove to Avernus is pleasantly reminiscent of the story of the man who had a bear by the tail; he didn't dare let go, yet could feel himself slipping.—EDITOR.]

*Read before the San Francisco Section of the American Institute of Electrical Engineers, January 28, 1916, by W. W. Briggs and W. G. Vincent.

Generated on 2024-09-30 01:10 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Concrete Train-Sheds Erected by the Unit-Method of Construction

By SHIRLEY HOUGHTON*

The adaptation of Unit-Bilt methods of construction to the umbrella-shed requirements for railway terminals has resulted in a new type of umbrella shed. Since the development of this shed in the latter part of the year 1914, the Southern Pacific Co. has built approximately 8000 lin. ft. of sheds, and the Denver Union Terminal Railway Co. will place 7000 lin. ft. in service by January 1, 1916.

At the new Southern Pacific depot in Los Angeles there are four lines of sheds 740 ft. long, divided into 37 bays of 20-ft. span, forming part of a system of subways,

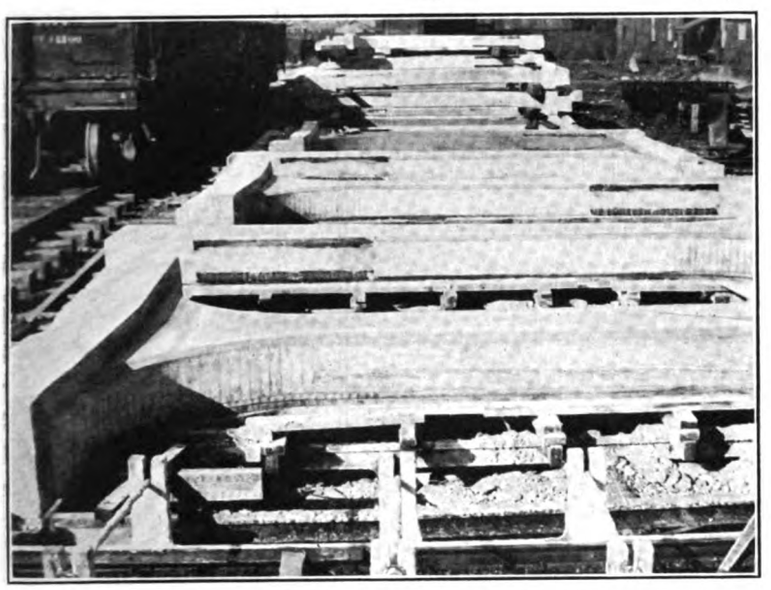


FIG. 1. COLUMN FORM WITH REINFORCEMENT.

inclines, and platforms for handling passengers from incoming and outgoing trains. The subway receives outgoing passengers from a broad incline leading from the station concourse, and discharges incoming passengers from the train platforms down into the subway and thence up an incline into the main exit of the station building proper. It is in the middle of the line of umbrella sheds, which extend to the right and left. The width of the subway is 33 ft. 6 in. and the length 220 ft. The floor is about 15 ft. below the level of the tracks. Access from the train sheds and platforms to the subway is by means of inclines, four on each side of subway. These are 7 ft. wide and 65 ft. 6 in. long and are on a 15% grade.

The spread of the umbrella shed is 18 ft., the outer edge of cantilevered butterfly wing being 16 ft. 4 in. above the top of rail, and the width of platforms is 16 ft. Provision for carrying electric conduit is made by chamfering off the edge of the roof slabs, so that there is a recess for the conduit between the two sections of roof slabs. In the centre of each bay, the electric conduit branches down to an outlet box on the underside of the roof slabs. The concrete roof-slabs are designed to carry rain-water back from the edge toward the centre of the shed-roofs. Each slab is cast thicker at one end than at the other. The two thick ends of the roof slabs are set against each other, forming a ridge that turns the water lengthwise of the sheds to a hopper-box at the point of juncture of the two thin ends of the slabs. This arrangement brings a conductor pipe at every other column of the shed construction.

The slabs are covered with a prepared 3-ply ready roofing. The drainage from the slabs is through a 3-in. galvanized-iron spout to a point 5 ft. from the top of the platform, from which it is through a 3-in. galvanized wrought-iron pipe into the sewer underneath the platforms.

Each edge of the concrete columns is protected by a 3 by 3 by $\frac{1}{4}$-in angle for a distance of 4 ft. above the top of platforms. Eight columns in each row of sheds supported semi-circular arches. When set over the inclines they were anchored in seats prepared to receive same in the incline-walls. Where set over the structural steel of the subway, a special structural-steel base was used to anchor in position.

The units were manufactured in a casting-yard situated in a portion of the Southern Pacific Co.'s yards, about half a mile from the depot site. A locomotive crane was used in the erection of the units, transporting units on flat-cars from the casting-yard to the site of the erection, as well as handling materials, forms, and pouring concrete in the casting-yard. This arrangement materially assisted in the progress of the work.

The photographs of the casting-yard illustrate the methods in use. Fig. 1 shows a column form with reinforcement in place ready to fill.

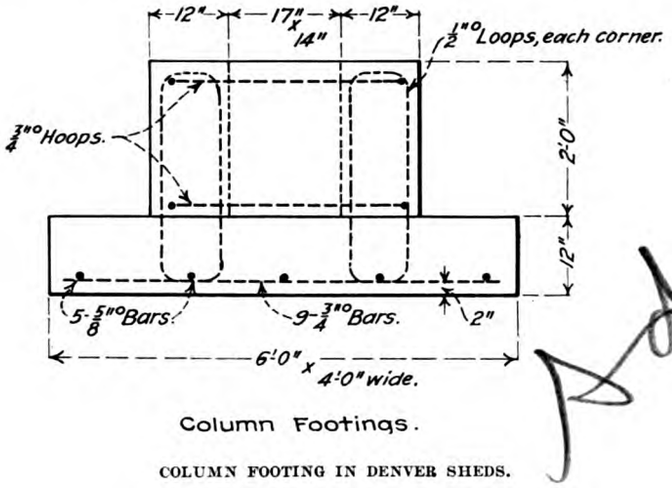
All forms were bedded on railroad rails set accurately before the placing of the forms. Fig. 2 is a view of one of the roof slab forms, which shows one of the 11-in. rib portions of the form. These rib depressions of the forms were lined with sheet metal in order to give a smoother surface to the finished concrete and to allow the lifting of the unit from the form with ease. All parts of forms were coated with the highest-grade paraffine oil before casting.

*503 Market street, San Francisco.

Generated on 2024-09-30 01:10 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The concrete was mixed in a 17-ft. cube mixer and dumped into a concrete bucket. This is picked up by the locomotive crane and carried to the form which is to be filled. Side forms of units are separate from the bottom forms, so as to be removed and used over again without delay. Consequently only one-third as many side forms are necessary as bottom forms. Side forms are removed within a few hours after pouring, which makes it possible to give the concrete any finish desired. At least seven days are allowed to elapse before the units themselves are lifted and the bottom forms made available for further use.

The umbrella-shed installation at the Third and Townsend Street depot of the Southern Pacific Co. at San Francisco, was similar in general design to the Los Angeles sheds already described. There were, however, no subways or inclines at San Francisco, as the terminal facilities there are not those of a through terminal. The

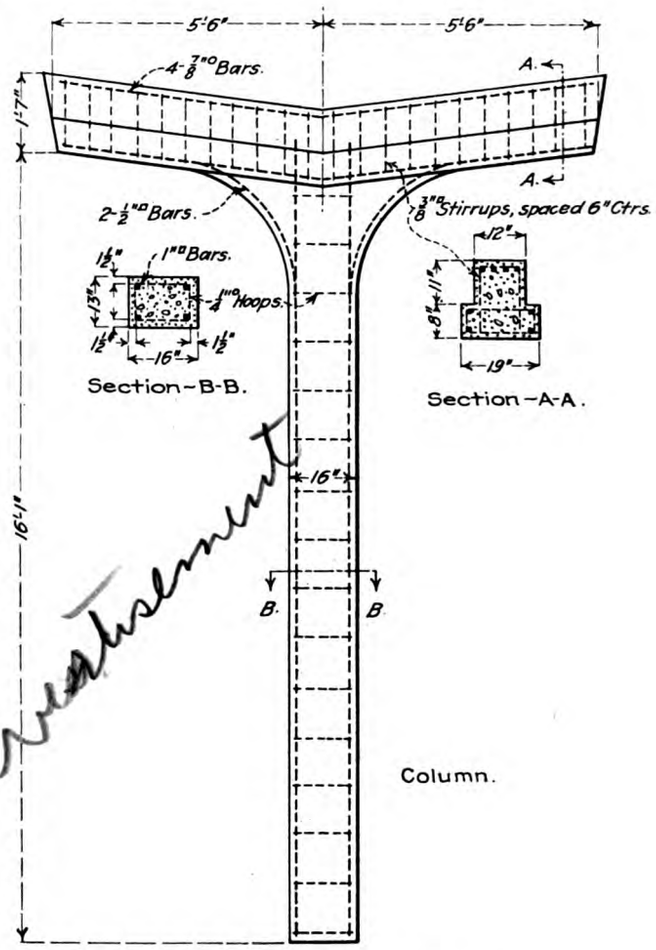


COLUMN FOOTING IN DENVER SHEDS.

trains head into the depot building, discharging their passengers onto platforms covered with umbrella sheds that connect with the main depot walls enclosing the depot concourse. There are six lines of sheds, each approximately 740 ft. long, each serving two tracks, or twelve in all.

The umbrella-sheds at the Union Depot, Denver, Colorado, are similar in a good many respects to those at Los Angeles. The installation at Denver includes three subways; one for passengers, one for baggage, and one for express. The baggage and express subways are equipped with elevators for handling the freight from the trucking platforms into the subways, and from the subways again to the baggage or express room floors in the depot building. There are five passenger platforms, 17 ft. 6 in. wide, covered with train sheds, serving ten tracks. Between each passenger platform, there is a trucking-platform for receiving all baggage and express matter. This arrangement eliminates all trucking from the passenger platforms, always a source of discomfort and, in some cases, danger.

Access to the passenger subway is from the depot concourse through an incline, and from the subway to the train platforms by ten stairways, five on each side of the subway. Arch columns in the stairway-abutment wall were used over the stairway. Across the subway, typical columns were used, seated and anchored in a special structural-steel socket.



TYPICAL COLUMN IN DENVER SHEDS.

Stress sheets showing the design and calculations for the typical columns and slabs on the Denver work are as follows:

Loading:

Inside beam	= 251 lb. × 20 × 2 =	10,040 lb.
Outside beam	= 590 lb. × 20 × 2 =	23,600 lb.
Column weight	=	6,960 lb.
		40,600 lb.

Direct stress $= \frac{40{,}600}{9 \text{ in.} \times 13 \text{ in.}} = 347$ lb. per sq. in. at minimum section.

Wind moment $= M_w$.

Slab	= 23 in. × 240 in. × 189 in. × 30 lb. =	18,100 ft. lb.
Column	= 12 in. × 165 in. × 95 in. × 30 lb. =	3,200 ft. lb.
		21,300 ft. lb.

$M_w = 255{,}600$ in. lb.

$A_s = \frac{255{,}600}{0.86 \times 14.5 \times 16{,}000} = 1.28$ sq. in.

Use four 1-in. square bars.

Cantilever:

Outside beam reaction	=	11,800 lb.
Cantilever	=	900 lb.
		12,700 lb.

Advertisement

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Moment four feet back from centre of outside beam (disregard bracket).

$M = 12{,}700 \times 4$ ft. $= 610{,}000$ in. lb.

$$A_s = \frac{610{,}000}{0.86 \times 18 \text{ in.} \times 16{,}000} = 2.46 \text{ sq. in.}$$

Use four $\frac{7}{8}$-in. round bars.

Area section = (11 in. × 12 in.) + (19 in. × 8 in.) = 273 sq. in.

$$\text{Shear} = \frac{12{,}700 \text{ lb.}}{273} = 47 \text{ lb. per sq. in.}$$

Use $\frac{3}{8}$-in. square stirrups, 6 ft. centre to centre.

Footing:

Try 6 ft. by 4 ft. = 24 sq. ft.
Wind moment = 21,300 ft. lb.

Soil pressure:

$$\text{Direct load} = \frac{40{,}600}{24} = 1690 \text{ lb. per sq. ft.}$$

$$\text{Wind} = \frac{6M}{bd} = \frac{6 \times 21{,}300}{4 \times 36} = 900 \text{ lb. per sq. ft.}$$

Total soil pressure = 2590 lb. per sq. ft.

Steel, 6-ft. way.

$$M_L = \frac{40{,}600}{4} \times 24 \text{ in.} = 244{,}000 \text{ in. lb.}$$

$M_w = 255{,}600$ in. lb.

Total moment = 499,600 in. lb.

$$A_s = \frac{499{,}600}{0.86 \times 10 \text{ in.} \times 16{,}000} = 3.63 \text{ sq. in.}$$

Use nine $\frac{3}{4}$-in. round bars.

Steel placed 4-ft. way.

$$M_L = \frac{40{,}600}{4} \times 16 = 162{,}400 \text{ sq. in.}$$

$$A_s = \frac{162{,}400}{0.86 \times 10 \times 16{,}000} = 1.18 \text{ sq. in.}$$

Use five $\frac{5}{8}$-in. round bars.

To prevent top turning off (stub bars).

$M_w = 255{,}600$ in. lb.

$$A_s = \frac{255{,}600}{29 \text{ in.} \times 16{,}000} = 0.548 \text{ sq. in.}$$

Use $\frac{1}{2}$-in. square loops at each corner.

Hoops:

$$A_s = \frac{255{,}600}{0.86 \times 22 \times 16{,}000} = 0.85 \text{ sq. in.} = 0.43 \text{ each side.}$$

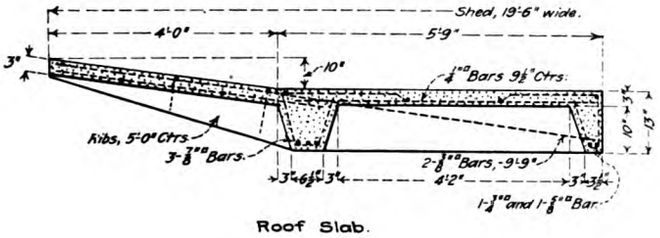
Use $\frac{3}{4}$-in. round bars.

In general, the procedure in connection with the construction and erection is similar to the Los Angeles work. From a comparison of the plans for the Denver work and the Southern Pacific work, it will be noted that the Denver sheds are of greater span, 19 ft. 6 in., and that the typical column at Denver was 12 by 16 in., while in the Southern Pacific work it was 12 by 21 in. at the platform line, tapering to 18 in. near the top.

No roofing material is to be placed on the roof slabs at Denver. These slabs are cast as waterproof as possible. Hydrated lime is added to the cement for the concrete. The top surface is troweled to a smooth hard finish. After completion of the train sheds, the roof slabs will probably be given a coat of some waterproofing compound.

An interesting feature of the design for Denver is the method of forming the expansion joints. These are formed by placing two columns on one footing and leaving a space of 1 in. between them to allow for expansion. Over the opening thus left is placed a sheet of galvanized iron bent so as to keep the opening closed to the weather at all times. Expansion joints are placed about 360 ft. apart.

The various photographs will show the manner in



Roof Slab.

Inside Slab.
Live Load on Roof = 32 #/□'
Dead " 3" Slab = 38 #/□'
70 #/□'
Clear Span = 4'-2"
Slab depth = 3"
Effective Span = 4'-5"

$M = \frac{WL^2}{8} = \frac{70\#/\square' \times (4'\text{-}5'')^2 \times 12}{8} = 2055''\# \quad fs = 16{,}000\#/\square''$

$As = \frac{M}{.86\,d.\,fs} = \frac{2055''\#}{.86 \times 2'' \times 16{,}000} = .075\square'' \text{ Per Ft.} = \frac{1}{4}''\square @ 9\frac{1}{2}'' \text{ Ctrs.}$

Outside Slab. Span 5'-0" Ctrs. of Ribs.

$M = \frac{WL^2}{8} = \frac{70\#/\square' \times (5'\text{-}0'')^2 \times 12}{8} = 2620''\#$

$As = \frac{2620}{.86 \times 2'' \times 16000\#} = .095\square'' \text{ Per Ft.} = \frac{1}{4}''\square @ 7\frac{1}{2}'' \text{ Ctrs.}$

Rib Beams. Slab Load 5'-0" × 70# = 350 # per Ft.
Ribs = 25 # " "
W = 375 # " "

$M = \frac{WL^2}{2} = \frac{375 \times (4'\text{-}0'')^2 \times 12}{2} = 36{,}000''\#$

$As = \frac{36{,}000''\#}{.86 \times 10'' \times 16{,}000\#} = .262\square'' = 2\text{-}\frac{3}{8}''\square = .28\square''$

Inside Beam. Span, 19'-0" Ctrs. Slab Load 70# × $\frac{5'\text{-}9''}{2}$ = 201#
Beam = 50 #
251 #

$M = \frac{WL^2}{8} = \frac{251'' \times (19')^2 \times 12}{8} = 136{,}000''\#$

$As = \frac{136{,}000''\#}{.86 \times 11 \times 16{,}000} = .90\square'' = \begin{cases} 1\text{-}\frac{3}{4}''\square = .56\square'' \\ 1\text{-}\frac{5}{8}''\square = .39\square'' \\ \hline .95\square'' \end{cases}$

Allowable Compression in Concrete = 650 #/□"
Total Tension = Total Compression = .90 × 16,000 # = 14,400 #/□"

Beam. Allowable Compression.

$.39 \times 11'' \times 6'' \times \frac{650}{2} = 9{,}000\#$

$4 \times 3\frac{1}{2} \times 3'' \times \frac{650}{2} = 11{,}700\#$

Total Allowable Compr. = 20,700 #

$\text{Shear} = \frac{251 \times 9'\text{-}6''}{5'' \times 11''} = 44\#/\square''$

Outside Beam. Span = 19'-0", Slab load = 70# 7'-0" = 490 #/ft.
Beam = 100 #
W = 590 #/ft.

$M = \frac{WL^2}{8} = \frac{590 \times (19')^2 \times 12}{8} = 320{,}000''\#$

$As = \frac{320{,}000''\#}{.86 \times 11'' \times 16{,}000\#} = 2.11\square'' = 3\text{-}\frac{7}{8}''\square = 2.31\square''$

Total Compression = 16,000 × 2.11 = 33,800 #

$12'' \times .39 \times 11' \times \frac{650}{2} = 16{,}700\#$

$8'' \times 3'' \times 3'' \times 400 = 19{,}200\#$

$35{,}900\#$

$\text{Shear} = \frac{590 \times 9'\text{-}6'}{9\frac{1}{2}'' \times 11''} = 53.6\#/\square''$

ROOF SLAB FOR DENVER SHEDS WITH STRESS-SHEET.

which the work proceeds. The most interesting feature of this Unit-Bilt all-concrete train-shed is the fact that a type of shed has been developed that has a low maintenance cost, is permanent and fireproof, and has a cost comparing favorably with the wood-roof and steel-frame train-sheds that have been used in the past. Such con-

Editorial

Generated on 2024-09-30 01:12 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

crete sheds can be built for approximately $12 per linear foot.

The train-sheds at Los Angeles and San Francisco were designed and constructed under the supervision of J. Q. Barlow, assistant chief engineer to the Southern Pacific Co. The train-sheds at the Denver Union depot were designed and constructed under the supervision of H. W. Cowan, chief engineer of the Colorado & Southern

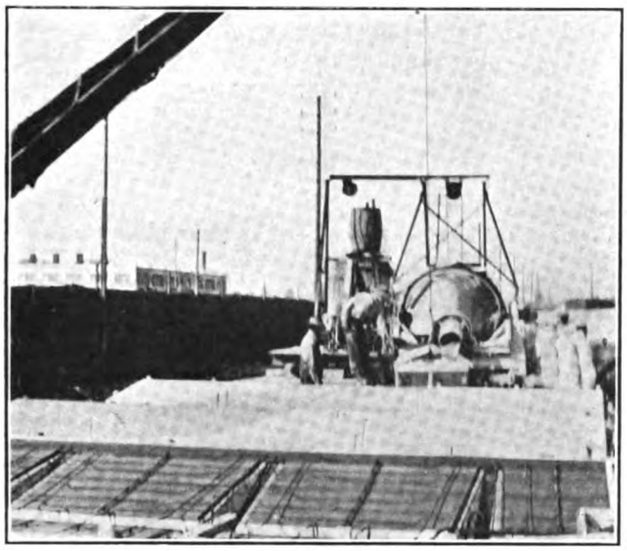


FIG. 2. SLAB FORMS.

railroad, and J. G. Gwyn, chief engineer of the Denver & Rio Grande railroad, acting as chairman of the engineers' committee of the Denver Union Terminal Co. The designs were made and the work of construction carried out in each instance by the Van Sant-Houghton Co. of Denver and San Francisco, Western representatives of the Unit Construction Co., St. Louis, Missouri, the latter company controlling unit construction through a number of patents.

[EDITOR'S NOTE.—This is the second article of Mr. Houghton's series on unit concrete construction. The third, which will appear in the March number, deals with the application of this system to the construction of railroad roundhouses.]

RESULTS OF PAVING EXPERIENCE IN NEW JERSEY

A report has just been issued by R. B. Gage, chief chemist for the New Jersey State Road Commission, embodying the results of the experience of the past few years in road construction in that state. The following conclusions are stated:

1. Any bituminous concrete pavement of either the hot or cold mixed grade, when properly constructed and laid on a suitable and well-drained base, will last at least five years with little repair, and from ten to fifteen years longer if the pavement is properly repaired and maintained.

2. These pavements cannot be properly constructed by novices, or even by experienced contractors unless they have the proper equipment and necessary financial resources.

3. It is false economy to award contracts to contractors who have not had the necessary experience, or who have not the required equipment and financial resources.

4. Hot-mixed bituminous pavements are more difficult to construct than those laid by the cold-mixed method.

5. The life of any bituminous concrete pavement is short unless it is properly constructed.

6. That hot-mixed bituminous pavements cannot be repaired as cheaply or conveniently as those constructed by the cold-mixed method.

7. When properly constructed, a hot-mixed bituminous-concrete pavement will, on the average, require less repairing during the first five years of its life than will a pavement of the cold-mixed type.

8. That a comparatively soft bituminous pavement, having a low tensile strength, is superior to a brittle pavement with a high tensile strength.

9. That over 90% of the early failures in bituminous pavements have been caused by faulty construction, unstable or improperly drained bases, and not by the use of inferior materials.

10. That an old well-drained macadam road, if scarified and redressed with a layer of 1½-in. stone, can be kept in a satisfactory condition, even when subjected to fairly heavy traffic, by frequently coating the surface with a liquid bituminous binder.

11. The cost of maintaining such a repaired macadam road in proper condition is not much in excess of the interest charge on the cost of an expensive bituminous-concrete surface.

12. A cement-concrete road, if properly constructed, would seem to need but little repairing during the first five years of its life.

13. Such a pavement makes a satisfactory surface for automobile traffic, and is not as slippery in winter as a bituminous-concrete pavement.

14. After such a pavement is no longer suitable as a surface, it can be used as a base for a bituminous or a block pavement.

15. When a pavement is to be subjected to much automobile traffic, the probable difference in durability between a cement-concrete road and a macadam road would seem to indicate that the former is more economical, even if the initial cost is somewhat higher.

16. If a cement-concrete road is not uniform in composition, it is prone to develop pot-holes. Pavements of this type are hard to repair satisfactorily.

17. The sub-foundation for a cement-concrete road should be more carefully prepared than for any other kind of pavement surface.

18. The application of a lignin binder to a gravel surface greatly prolongs the life of such a road. It prevents it raveling during the dry season, or becoming soft when the frost is leaving the ground.

Generated on 2024-09-30 01:16 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Practical Testing of Asphalt and Road Oil*

Asphalt, as used in paving, is really a semi-liquid glue. Its function is to bind together the particles of road mineral, large or minute, with a flexible, yet sure grip and to hold them, cushioned, but without displacement. This glue, is never, at air temperatures, a solid, in the broader sense, but will flow slowly, even in the hardest state used. When these apparently deleterious properties are considered, the need for determining the conditions under which this semi-soft cement will be serviceable, is evident. A well-defined standard has been evolved for asphaltic paving. To maintain this is the object of the asphalt testing laboratory, municipal or commercial, of today.

A profuse array of tests has been proposed for asphalt. To consider them all, even in review, would merely confuse. To attempt to employ them all would be impractical and needless. Of the many proposed, only a few can claim a regular place in practical testing. The city of Los Angeles has developed specifications that include the essentials of asphalt testing for California conditions.

First, to determine whether the asphalt is fit for admixture with the road minerals.

A test is made upon the prepared asphalt, or asphaltic cement, as it is called, for degree of softness, dependent upon the extent of distillation of the oil, and consequently upon the degree to which the light oils were driven off from the crude. This is called the penetration test. The point of a needle of specified size and kind is brought to the surface of the asphaltic-cement sample, which is at a definite temperature (77° F.) The needle which is held in a frame, and which weighs 100 grams in all, is released for five seconds. These requirements constitute the District of Columbia standard. The needle and frame sink a distance varying with the softness of the asphalt. The depth of penetration is gauged by a micrometer rod and dial, reading to 0.01 cm. The number of points, or hundredths of a centimetre, is given as the penetration of the sample. The machine for making this test is called a penetrometer.

The chemical composition and condition of asphaltic cement is scarcely less important than its penetration, for asphalt within the specified limits of consistency, may yet be worthless for paving. Usually this comes from abuse either in distillation or in the kettles at the paving-plant, by overheating and 'cracking' or decomposing some of the hydrocarbons of the asphalt. This 'carbene' condition, as it is termed, gives, instead of a resilient, ductile, binding cement, a harsh, brittle one, making a pavement that deteriorates rapidly under traffic. The prevention of carbenes is simple, for 'cracking' will only occur at unnecessarily high temperatures; 600° F. is the limit permissible. Detection of carbenes is accomplished by treating a sample with a solvent that will dissolve the asphalt proper, and leave a residue proportional to the extent of the carbene condition. Bromine in carbon bisulphide attacks 'cracked' asphaltic cement. By filtering the sample through a Gooch crucible and weighing, carbenes are readily determined.

Constant watching for excessive carbenes (a few hundredths of 1% is to be expected) is not the only requirement. Pure carbon bi-sulphide will dissolve practically all the asphalt proper, and the residue will be mineral or foreign matter of which there should not be over 0.2 per cent.

Hydrocarbons of different classes are found in the complex and variable material known as asphalt. It is often desirable to know the proportions of the constituents. Naphtha and sulphuric acid are two solvents which are used for this determination. An occasional test suffices, though a new source should be carefully checked.

Water and sediment are readily separated from road oils by the centrifuge.

An asphalt may pass all the foregoing tests and yet may contain light oils, which will volatilize at the temperature of use and leave a harder residue than desired. Such a condition may result either from the peculiarities of the crude oil used in preparation, or from the addition of some soft asphaltic cement or oil, to attempt to reclaim some over-hard asphalt.

In either case, the test is simple. A sample is heated in an open container, driving off the volatile constituents, and the loss is determined. This test is applied to all grades of asphalt. Viscous road oil may be expected to contain as much as 25% of moderately light oils. When mixed with the road material this will be volatilized gradually in the sun. When tested, it is subjected to a lower temperature and for a shorter time than the asphaltic residue used in mechanically mixed pavements. For the latter the temperature used is 325° F., and the time five hours. The asphalt remaining after volatilization is further tested for penetration. This should be not less than one-half of the original figure. In the case of road oils, after testing for light oils, the heavier volatile material may be driven off at higher temperatures, up to 425° F., leaving only the asphalt proper. The penetration of this residue may then be taken.

With road oils all testing has been done that need be done, but further tests of asphaltic cements are required. The second group of tests are made after the asphalt is combined with the mineral road materials.

*Abstract from paper presented before the League of California Municipalities by T. A. Fitch, asphalt tester for city of Los Angeles.

Generated on 2024-09-30 01:10 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The mixture at the plant is first to be tested. The method of testing is to dissolve from a heated sample, preferably by a mixture of carbon bisulphide and carbon tetrachloride, all the bitumen leaving the clean sand and dust. This is put through standard sieves from 10 meshes to the inch to 200 to the inch. Each fraction is weighed separately and the total gives, by subtraction, the proportion of asphalt.

At the paving-plant, as at the refinery, the thermometer is an essential. Guarding against overheating is important, though underheating is no less serious. Asphaltic cement, sand, and rock, before and during mixing, are kept at from 250° F. to 375° F., according to circumstances.

A sample cut from the street should be tested. The proportion of asphalt and of the mineral aggregate are determined by mechanical analysis and serve as the last word as to the composition of the pavement.

The nicety of proportioning, corresponding to the degree to which the asphaltic cement and fine dust of the mixture are forced by the rolling into even microscopic interstices is here shown. Here, then, comes the vital test of specific gravity, which, considered with the mechanical analysis will determine the quality of the pavement.

Everywhere, the trend of asphalt testing is toward prevention of faults, rather than detection. Thus, instead of occasional observations of temperature of the asphalt in the melting-kettle, and of the hot dried sand or rock ready to mix, the use of a recording pyrometer will show any temperature beyond safe limits.

In the laboratory, efforts are made to produce street conditions by preparation, mixing, and compression of various experimental combinations, on a small scale. The city of Los Angeles has a miniature mixer, with a box 12 in. long and adjustable mixer teeth or paddles, so that any phase of mixing may be varied at will. A sufficient mixture may be prepared at a batch to make a tamped test-block suitable for present and contemplated mechanical tests, as well as regular analysis.

By employing the test methods, outlined above, a pavement may be constructed with the assurance that it will perform its functions for years. A decade ago, asphalt paving was mainly guesswork. Today, careful, consistent asphalt testing is producing good streets.

Electric heating is used extensively on the Minidoka, Idaho, project of the United States Reclamation Service. Energy is supplied from the hydro-electric plant constructed by the Reclamation Service on the Snake river. This plant generates 10,000 hp. Its primary purpose is to furnish power during the summer months for the irrigation of 50,000 acres of land too high to be reached by the gravity canals. To fill in the 'sag' in the load-curve for the year, rates for heating during the winter months have been established at $1 to $1.25 per month per kilowatt of capacity. At these rates, electric heating is almost as cheap as heating with coal, the most available fuel, at $8 per ton. A concrete school building at Burley, Idaho, accommodating 2000 pupils, is served by a heating plant having a capacity of 700 kilowatts. A 50-room hotel at the same place is heated by 250-kilowatt plant.

ANNUAL REPORT OF COAST AND GEODETIC SURVEY

The annual report of the superintendent of the United States Coast and Geodetic Survey to the Secretary of Commerce discusses the work accomplished during the year, and the conditions and needs of the survey. A description of the hydrographic work is given on four maps, whereon the work already completed, the work partly finished, and that remaining to be done, are shown in different colors.

The lack of suitable vessels for the work of the survey is discussed at length. Three of the old vessels have been condemned during the year as no longer safe, on account of age and structural weakness; two others are for the same reasons only fit for service in sheltered waters; only one vessel now in commission is fit for work offshore, and it is in the Philippines. The report urges the building of two additional vessels of suitable size and equipment to take up offshore work in Alaska and elsewhere as required. Much of this work is needed off the coasts of California, Oregon, and Washington.

As a result of the increased appropriation last year, it was possible to place four wire-drag parties in the field, instead of two. The results prove the wisdom and necessity of doing this work on a much larger scale. The use of the wire drag has revolutionized hydrographic surveying. It has long been realized that soundings with the leadline, no matter how carefully and closely spaced, were not infallible, and that submerged rocks and ledges were often missed, as has been demonstrated by numerous wrecks and other damage due to striking unknown rocks in surveyed waters; but with the development of the wire-drag these submerged dangers have been discovered and charted.

The importance of having the geodetic work of the country done by the Government rather than by individual States is discussed, with the conclusion that the Federal Government should complete the general program which is being followed by the United States Coast and Geodetic Survey. This plan is, briefly, that the primary triangulation scheme, and the precise level net should be so extended that there will be no place in the United States more than 100 miles from a primary triangulation station, or a precise-level benchmark. Besides this work in the interior of the continent, triangulation is needed in the interior of Alaska, across the Alaska Peninsula, and from the Dixon Entrance to White Pass.

The purchase of Dutch Harbor, Alaska, as a Government supply base in western Alaska is advocated. This would benefit the Coast and Geodetic Survey, the Bureau of Lighthouses, and the Coast Guard.

Generated on 2024-09-30 01:15 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

The Control of Petroleum and Natural-Gas Wells*

By ALFRED G. HEGGEM†

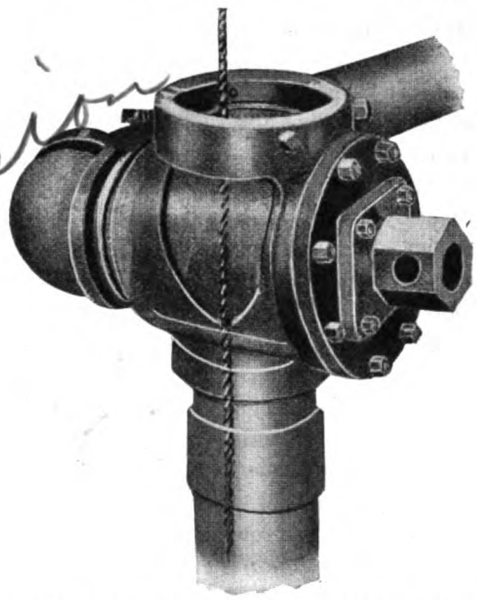
It is the purpose of this article to describe methods recently introduced into the oil and natural-gas industry to safeguard the lives of the workmen and to protect property from destruction. Only such drilling methods are described as pertain directly to the operations necessary to maintain the well under complete control at all times.

It may seem incredible that until recently practically all wells were drilled without the provision of any means for control. To drill a hole into a boiler carrying high-pressure steam without first providing means to control the escape of steam would be unthinkable, yet in oilfields, wells are drilled into a gas or oil formation with a possible pressure of 300 to 1800 lb. per sq. in. and a daily flow of 20,000,000 to 80,000,000 cu. ft. of gas or 1000 to 15,000 bbl. of oil per day. Some wells have produced in excess of 100,000 bbl. of oil per day, but these are exceptional cases. In addition to the loss of product, one must consider the great danger attendant upon the promiscuous liberation of such an amount of explosive and inflammable substance.

The introduction of metal casing to secure a permanent and impervious wall in a well made the drilling of deep wells possible and eliminated many of the original problems encountered in well-drilling, but it did not insure the control of the well. To obtain the full value of the casing it was essential that a pressure-tight joint be made between the wall of the well and the lower end of the casing. Many materials in various forms were used, including cotton, hemp, stable refuse, oats, rice, cloth, leather, cork, rubber, lead, clay, and cement, resulting, after a slow process of evolution, in the general adoption of two types of bottom fittings for casing. These are the 'long shoe,' having a diameter approximately that of the casing couplings, and fitting into a hole especially prepared to insure a solid and close contact; and the rubber 'packer,' consisting of a rubber cylinder forced into tight contact with the wall of the well and the exterior of the casing respectively. The other materials mentioned are used now only under special conditions, except clay and cement. Both of these are used extensively, generally in combination with either the long shoe or a packer.

Under general conditions, the weight of the casing, together with the friction between the casing and the walls of the well, is sufficient to withstand the lifting force of the gas or oil. The friction between the casing and the walls of the well is likely to vary greatly, and at best is uncertain. Additional friction is often obtained by cementing the casing within the well, and where high pressures are encountered it is customary to fasten the several strings of casing together by means of clamps, thus adding the weight and friction of the outer strings of casing, to that of the inner string. Another practice is to bury heavy wood sills some distance below the derrick floor and make connection to the top of the casing by means of anchor-bolts and clamps.

With the bottom of the casing securely in place, and forming a pressure-tight, non-leaking joint, the top of the casing remains to be considered as regards control. Valves of various types have been tried. While not accomplishing as much as was desired, they were in many cases a necessity.



PHANTOM VIEW SHOWING POSITION OF VALVE WHEN WELL IS SHUT IN.

In its highest form, this type of equipment consisted of a gate-valve, of inside diameter greater than that of the casing, surmounted by the casing-head, the two being connected by a short nipple. This arrangement provided the usual casing-head to which flow-connections could be made and through which drilling operations could be conducted. In addition, the gate-valve furnished means by which the well could be shut in when the drilling tools were removed.

It was thought by many that a gate-valve so placed on the head of a well, insured control, but many failures of this arrangement in practice demonstrated that it did not safeguard either life or property and really caused a false feeling of safety. In fact, because of inability to close the valve promptly at a critical moment,

*Paper to be presented before the American Institute of Mining Engineers, at New York, February, 1916.

†Petroleum Engineer, Tulsa, Oklahoma.

Generated on 2024-09-30 01:15 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

oil or gas has become ignited and burned with great violence, making approach to a well impossible. The gate-valve then had to be removed by shooting off with a cannon-ball, or other means, before the well could be brought under control.

A proper closing and controlling device for an oil or gas-well must meet the following requirements:

It must permit all drilling operations to be carried on without interference; permit immediate and tight closing; control the flow without back-pressure; insure safety to workmen; be simple in construction; be compact; be sufficiently strong to control maximum pressures; be proof against injury in handling; be unaffected by sand or fire.

The control casing-head, combining the functions of a gate-valve and a casing-head, was designed to meet these requirements, which are considered necessary to safeguard life and property during the operations of well-drilling. This device is similar in general appearance and size to the common type of casing-head in general use. It can be placed above or below the derrick floor, at the will of the operator, and is arranged for standard fittings. The top opening is threaded to receive a drilling-nipple or any of the other top connections usually employed in gas-wells.

The interior of the head is bored out to a true cylindrical form into which the plug or valve is fitted closely. This valve is open at one end to provide a lateral passage for the oil or gas; the other end is reduced in diameter to form a stem, which extends through a suitable stuffing-box and by which the valve may be operated. On the stem side of the valve a flat surface, or flange, fits closely against the base of the stuffing-box, making a tight joint, thereby relieving the stuffing-box to a large degree of the duty in preventing leakage. The end of the stem is hexagonal in form to accommodate a wrench, but a transverse hole provides a more convenient means of operating the valve by use of a bar of iron, such as a bolt or piece of 1-in. pipe. To provide for the convenient operation of the valve at a distance, when the casing-head is below the floor or is otherwise not readily accessible, the end of the stem is bored and threaded for an extension of standard 2-in. pipe.

The back of the valve is broad enough to close either top or bottom opening in the body completely, and to provide sufficient lap to prevent leaking. On each side of the back of the valve is a groove, or notch, of sufficient size to receive the drilling line, sand line, or torpedo line. By this provision the valve does not injure the line, when closed, while completely shutting in any flow. By means of the end opening, as well as by recessing the back of the valve, the pressures within the casing head are counter-balanced to a large degree, making the operation of the valve easy.

The valve is simple, consisting of but four pieces, and having only one moving piece. It cannot be damaged by any of the usual drilling operations or by rough handling. Stops are provided within the body to prevent the valve from being turned too far in either direction. With the valve in normal position a quarter turn of the stem is all that is required to close the top or the bottom opening, turning the flow into the tanks or entirely shutting in a well.

The control casing-head is used in much the same manner as gate-valves and common casing-heads, but it has many special uses that have developed largely from experience with the great number in operation in various oilfields.

When drilling a well in 'wildcat' territory it is not possible to foresee what conditions may be encountered. Many wells so drilled have 'gone wild' with great destruction of property and in a number of cases with loss of life. Some of these wells have ruined fields of good prospective value by letting water in on the oil in such quantities as to render further operations in that district unprofitable.

For such cases it is desirable to place a control casing-head on the first string of casing landed in the well and maintain it through all subsequent drilling operations. This insures that the well can be kept under control. If oil or gas is encountered unexpectedly the well can be shut in instantly until provision is made for taking care of the flow. It is not necessary to withdraw the tools as the valve will close tightly around the line, so no time need be lost in bringing the well under control. Also, with the flow stopped or controlled, there is no force acting to expel the tools. When a new string of casing is set inside of the one carrying the controlling device, it may be placed with the top below the head to avoid interfering with the free action of the valve; or the control head may be set on the inner string by using a swage nipple; or a smaller head of suitable size may be used.

If it is desired to shut in gas between the two strings of casing, a packing-ring may be screwed into the larger casing-head and a gas-tight joint made on the outside of the inner casing. This process may be repeated with each string of casing inserted in the well. Of course where several heads are used on the same well, the larger ones should be placed below the derrick floor in order that the last casing-head may not extend to such a height above the floor as to interfere with the ready wrenching of the tools or limit the length of temper-screw that may be let out.

When drilling in an established field the control casing-head is placed on the last string of casing to be seated in the well. Since it is about the same height as the common casing-head, it does not interfere with the wrenching of the tools or other drilling operations. If a pocket of gas is encountered, the well may be instantly shut in without removing the tools, all fires may be safely extinguished and the boiler moved back to a safe distance, when drilling may be resumed. On reaching the oil-sand, if the well starts to flow, it may be shut in, or if flow-line connections have been made the entire flow may be diverted to the flow-tank. When the flow ceases, drilling may be resumed and continued without loss of time until the well again starts to flow.

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

If the well flows continuously, an oil-saver is placed on the line immediately above the control casing-head, while the latter is closed. When ready, the valve is turned to allow the oil-saver to enter the seat in the top of the casing-head. This may be accomplished without loss of oil, wells producing as high as 10,000 and 12,000 bbl. of oil per day having been drilled in this manner without any oil showing on the derrick.

The prevention of waste of oil in drilling means not only a saving to the operator, but also the reduction of the fire hazard to a minimum. The driller and tool-dresser do not get drenched in oil and thereby risk fatal injury by fire. Fatal accidents have frequently occurred under the usual conditions prevailing before the introduction of the control casing-head.

Moving the boiler away from the rig does not eliminate all hazard. Cases are known where a tool-dresser with clothes soaked with oil from a spraying well, has approached the boiler to try the water-cocks and has had the flames from under the boiler set fire to his clothing. Such accidents are almost always fatal.

It often happens that, while a well still flows or sprays oil continuously, the yield has become reduced to such an extent that shooting must be done in order to save the well. There are, in fact, many reasons for shooting a well, even though the flow-pressure is such as to make the placing of the shot a hazardous undertaking. Frequently a well will flow during the placing of a shot, causing the shell to be ejected from the well and to explode in the derrick, with frightful loss of life and property.

The use of the control casing-head on the inner string of casing makes the shooting of any well a safe operation. The shell containing the 'shot' is lowered until the top is below the casing-head, when the valve in the latter is turned to close the top opening, and the oil, which under former conditions would spray into the air and be lost, is now caught in the flow-tank. The slight opening in the rope-notch of the valve which permits the torpedo line to slip through is not sufficient to permit an appreciable amount of waste. The valve is maintained in this closed position until the shell is landed on bottom and the torpedo line withdrawn. It is then opened to permit the introduction of the squib, or other means employed to explode the shot, and is kept open until the well has cleaned itself, when it may be closed in time to catch the 'second flow.' While the usual practice demands that the well be open during shooting to permit the well to cleanse itself of the torpedo-shells and of the sand and other material loosened by the shot, yet by the use of the control casing-head all of this material may be deflected into a tank without putting a back pressure on the well. Not only will all of the oil be saved, but a more complete record of the effect of the shot will be found in the accumulation of fragments of rock thus loosened and trapped.

The introduction of the control casing-head has made it possible to shoot wells of any size regardless of the amount of flow and it has in practice demonstrated its value by checking the flow in a well which threatened to expel the shot, consisting of 20 quarts of nitroglycerine contained in two shells joined together. In this case, of course, the valve was turned to close the bottom opening and entirely shut in the well. This was done instantly and without injury to the torpedo line.

While the name 'casing-head' would seem to imply a use limited to oil-wells, the control casing-head is equally useful in drilling gas-wells, and is used in the same manner as in drilling wells for oil. In many places it is customary to drill gas-wells during daylight only and to allow the well to remain open during the night, thus wasting a large volume of gas and

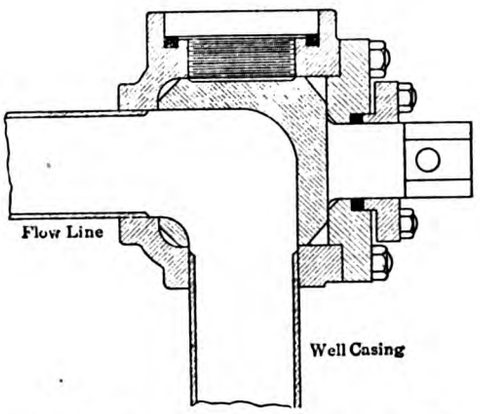


FIG. 1. SECTION OF CONTROL CASING-HEAD.

reducing the rock pressure on the gas that remains in the sand after the well is completed. With the control casing-head on the well the gas can be shut in during the time when active drilling operations are suspended. Not only is the waste of gas stopped and a higher rock-pressure insured, but also the fire hazard is practically eliminated.

When the well is completed the control casing-head is utilized in the same manner as the common 'T' fitting. The usual top and side connections are made to the head, with the advantage that in the event of leaky gate-valves, or damage to the lines, the gas may be instantly shut in and repairs made without waste of gas or danger of fire. After a gas-well is completed, it is the usual custom to limit the flow of gas into a pipe-line by partly closing the valve at the head of the well. In the case of a gate-valve, this leaves a crescent-shaped opening of great length and slight width, with the result that the flow rubs the sides of the opening, causing wear of the gate and seats and destruction of the valve. The control casing-head, in contrast, gives a small round opening gradually increasing to an oval-shaped opening, thus presenting a minimum rubbing surface in contact with the gas and reducing the wearing action. The tight closing of the valve in the control casing-head and

Generated on 2024-09-30 01:13 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

the freedom from leakage are important advantages in securing long life and freedom from accidents.

Owing to the absence of recesses and projections within the body of the control casing-head there is no place in which sand can lodge to interfere with the action of the valve. The sand carried by flowing oil during drilling operations does not impede the easy operation of the valve. While sand cannot lodge and interfere with the action of the valve, there is a possibility of injury from the cutting action of sand. To meet this condition the valve portion is made with a curved surface to deflect the flow gradually from vertical, in the casing, to horizontal, in the flow-line. This curved surface is backed by a great thickness of tough metal which will resist the scouring action of the sand for a long time. By thus gradually changing the direction of flow, no flat surface is exposed to the direct impact of the sand and the cutting action is materially reduced.

Some operators prefer to cushion the flow when the well is making much sand. This can be done readily by screwing a short joint of pipe into the top of the casing-head and closing the top of the pipe by a metal plug. Sometimes a plug of wood is driven into the cushion-pipe to protect the metal plug from being cut by the sand. This cushion-pipe may be assembled and secured in place while the casing-head is closed, after which the valve may be turned to the side position out of the path of the oil and sand.

Gas is frequently encountered in drilling for oil and interferes with the further drilling of the well. Experience has shown that gas may be found in large volume and at high pressure above a formation containing oil in paying quantities. This fact has led to much waste of gas in an endeavor to reduce the pressure so that drilling could be continued to the deeper oil-bearing formation. For a long time this waste of gas was considered necessary and was condoned on the ground that the value of the gas so wasted was less than that of the oil subsequently secured. Aside from the loss due to the waste of the gas, the delay in drilling adds greatly to the expense of the well, and postpones the recovery of oil, entailing a further loss of oil through offset wells which have previously tapped the oil sand and are drawing from the common pool.

It behooves the operator to complete his well in the shortest time possible; therefore, the modern method is to seal off the gas-sand and continue drilling without further delay. The use of mud-laden fluid in 'killing' a gas-well is too well known to require a description here, but it may be interesting to know that the 'lubricator' method of introducing mud into a gas-well presented some practical difficulties in operation and was attended with some hazard. The large gate-valves which were used became difficult to operate, partly because they were not designed to operate in mud.

By using the control casing-head already on the well, these difficulties and the expense and the loss of time involved in securing special gate-valves are avoided.

One or more joints of any size casing available are set on top of the control casing-head. Two joints of 10-in. casing are my own preference. To the top of the casing extension thus provided, a 2-in. pipe-line is connected and brought down the outside of the extension to within about 4 ft. of the floor, the end being fitted with a valve or stop-cock (Fig. 2). From the side outlet of the control casing-head a 2- or 3-inch connection is made to the pump discharge. This line should be provided with a check-valve and a stop-cock. As the control casing-head is designed for a pressure of 1800 lb. per sq. in., all other fittings should be selected from extra heavy stock. The 2-in.

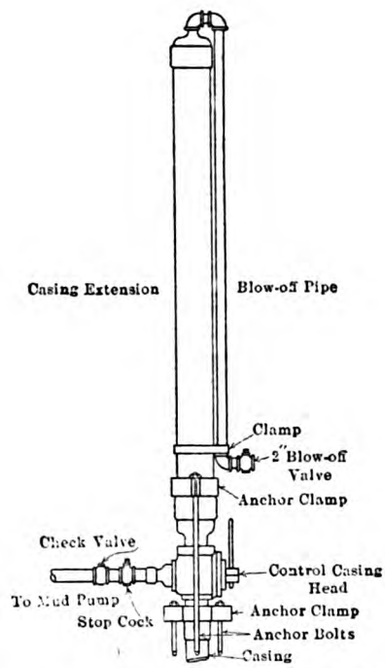


FIG. 2. ARRANGEMENT FOR PUMPING MUD-FLUID.

down-pipe from the top of the extension should be securely clamped to the extension, and the valve-controlled outlet should be turned in a direction away from the operator. These fittings are all connected while the well is shut in. The pump is then started and mud-laden fluid pumped into the extension chamber until it is full. This is indicated by mud showing at the outlet of the blow-off pipe. This outlet is then closed and the valve in the casing-head opened, permitting the mud to pass into the well. As soon as the extension chamber has emptied, the valve in the casing-head is again closed and the outlet valve on the down-pipe opened. This operation is repeated until the well is filled and the gas 'killed.' The advantage of this arrangement lies in the fact that everything is controlled from the derrick floor and no extra help is required. Also time is saved, since the pump will start delivering mud into the extension chamber as soon as the gas pressure is reduced, and,

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

further, it is possible to pump directly into the well without any change of fittings.

With the old method of closing in a flowing well, a flat top was set in the old-style casing-head several inches above the side outlet. The column of oil would strike this flat top at high velocity and be divided into a fine spray, which, upon mixing with the gas, would appear as a blue 'smoke' over the flow-tank. This spray would float in the air for a considerable distance, wasting a large amount of oil and covering the surrounding trees and grasses with an inflammable oil. It would also settle in so-called 'gas-pockets' along the road, frequently becoming ignited by passing automobiles, with attendant loss of life and property. As previously mentioned, the curved form of the valve in the control casing-head gradually deflects the current of oil into the flow-line. The oil is not divided into a spray, more good oil is put into the tank, and the fire hazard is reduced.

The control casing-head fills a want that has been long felt and is rapidly being adopted as standard equipment in the drilling of wells for petroleum and natural gas.

In September, 1915, there were approximately 1,000 control casing-heads in use. Although a great variety of conditions have been encountered in drilling wells, which have ranged from dry holes to oil-wells producing 12,000 bbl. per day, and gas-wells having a rock pressure of 1150 lb. per sq. in. and producing 40,000,000 cu. ft. per day, there has not been a single failure of the head to safeguard life and property, and not one well has burned or become unmanageable.

OIL PROSPECTS OF REGION NORTH OF COALINGA, CALIFORNIA

The oil prospects and resources of the region extending northward from the Coalinga district to the vicinity of San Francisco Bay, California, form the subject of a report issued by the United States Geological Survey resulting from investigations made by geologists Robert Anderson and R. W. Pack.

This region lies along the west side of the San Joaquin valley, between latitudes 36° 15′ and 37° 45′N., occupying a position similar to that of the Coalinga and Midway oilfields near the south end of the same valley. As it contains many geologic features like those found in the productive fields, it has been regarded as a likely place to prospect, and in order to determine the probability of the discovery of commercial oil-pools the Geological Survey made an examination of the region. It is not believed probable that any large oilfield will be developed in this region, but several small areas offer promise of yielding oil in commercial quantities. These areas are in the Vallecitos district, near Ciervo mountain, a point in the foot-hills about 25 miles north of Coalinga, and near Tesla. Besides describing the areas in which little or no drilling has been done the report discusses briefly the Coalinga field, attention being given particularly to the deep sand that has been found in a few wells in the East Side field. The areas in which prospecting for this sand may be carried on with reasonable assurance of success are fully described.

Other mineral resources of the region are briefly discussed. With the exception of the New Idria quicksilver mine, the largest producer of quicksilver in the United States, the mineral production is unimportant. This report, Bulletin 603, 'Geology and Oil Resources of the West Border of the San Joaquin Valley North of Coalinga, California,' may be had on application to the Director of the United States Geological Survey, Washington, D. C.

REPORT OF COMMITTEE OF AMERICAN SOCIETY OF CIVIL ENGINEERS ON A NATIONAL WATER-LAW

At the annual meeting of the American Society of Civil Engineers, a progress report was presented by the committee on a national water-law, composed of F. H. Newell, chairman, George G. Anderson, Charles W. Comstock, Clemens Herschel, W. C. Hoad, Robert E. Horton, John H. Lewis, and Gardner S. Williams. The report calls attention to the fact that while the use of water for navigation has been given precedence by the Federal statutes and the courts, it is in reality, relatively unimportant except in the case of a few of the larger rivers.

The uses of water are listed as follows in the order of their relative importance: domestic, watering of live stock and irrigation, sewage disposal, manufacturing and power-generation, and navigation. Land drainage is frequently a necessary adjunct of irrigation. In this connection, the right to the use of the natural waterways for land drainage should be recognized, being frequently as important as their use for sewage disposal. The preservation of property by flood-control measures is closely related to manufacturing and power-generation. Of the five uses enumerated, the first three are essentially uses at large, and should take precedence over the last two, which are essentially commercial uses, developed chiefly for individual gain.

In the consideration of any particular project for the use of water the public welfare should be paramount. Each river system should be considered as a unit, regardless of political boundaries, and the development of any river-system should be in accordance with a comprehensive plan. The highest economic use of the water should be considered irrespective of whether the utilization be accomplished by private enterprise or directly by the commonwealth.

The powers of Congress are so restricted by lack of constitutional authority that the enactment of a comprehensive national water-law is impossible at the present time. The end in view in the appointment of the Committee can be achieved only after an extensive campaign of education. The continuation of the Committee and the broadening of its scope to include State as well as Federal laws is recommended.

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Petroleum Production in the United States in 1915

According to John D. Northrop of the United States Geological Survey the marketed production of petroleum in the United States in 1915 was approximately 267,400,000 barrels. The total yield was 291,400,000 barrels, about 24,000,000 barrels of oil brought to the surface during the year being placed in storage.

The following table shows by States the marketed production of petroleum in 1914 and an estimate of the corresponding production in 1915, in barrels:

States.	1914.	1915.
California	99,775,327	89,000,000
Oklahoma	73,631,724	80,000,000
Texas	20,068,184	26,000,000
Illinois	21,919,749	18,500,000
Louisiana	14,309,435	18,500,000
West Virginia	9,680,033	9,000,000
Pennsylvania	8,170,335	8,700,000
Ohio	8,536,352	7,900,000
Wyoming	3,560,375	4,200,000
Kansas	3,103,585	3,000,000
Indiana	1,335,456	1,000,000
New York	938,974	900,000
Kentucky	502,441	450,000
Colorado	222,773	200,000
Other States	7,792	50,000
	265,762,535	267,400,000

Prices at the well were uniformly low in all fields from January to August, when the permanent decline of the Cushing field resulted in an increased demand for oil produced in other parts of the country with a consequent advance in the scale of prices warranted. From the low level of $1.35 per bbl. maintained from April 3 to August 14, 'Pennsylvania grade,' the market standard, advanced steadily during the last third of the year, reaching $2.15 per bbl. on December 17. 'Kansas and Oklahoma' grade showed an even more rapid recovery. From its low level of $0.40 per bbl. maintained from February 15 to August 2, this grade advanced to $1.20 per bbl. in a little more than four months, passing its former high level of $1.02 on December 13, and attaining the price above quoted on the following day. California grades were fairly steady throughout the year, a 5-cent cut affecting heavy oils in the valley fields on June 7 and a corresponding advance affecting the same grade of oil on October 26, followed by a general advance of 2½ to 5 cents on all grades except Ventura county and Santa Maria, effective November 20. This was followed by another advance of from 3 to 7 cents on valley oils, and a somewhat greater one on oil from other fields on December 31.

Throughout the country as a whole drilling activity was at a low ebb in all the developed fields until late in the year when rising prices proved an incentive for a moderate amount of new work. The Cushing field, Oklahoma, and the newer pools discovered as the result of wildcat drilling during the year sustained a marked activity which was due to local competition rather than to general conditions of the oil market.

The petroleum output of Wyoming was materially increased in 1915 as the result of the completion of a 6-in. gravity pipe-line by the Illinois Oil Co. from the Grass Creek field in Hot Springs county to the Burlington Railroad at Chatham as well as the opening in September of a prolific south-westward extension of the old Greybull field on town lots in the city of Greybull. A monster gas-well with an estimated capacity of 20,000,000 cu. ft., open flow, was completed on the Byron anticline in north-western Bighorn county late in September. The most important development of the year, however, was the opening of a new oilfield on the Silvertip anticline in north-eastern Park county along the Montana boundary. The first well in this field was in section 1, township 58 north, range 100 west, of the 6th principal meridian, and was completed in November at a reported depth of 1100 ft. The initial flow was estimated at 400 bbl. A number of good wells was completed in this field before the end of the year both in Wyoming and across the State boundary in Carbon county, Montana, as well. At Havre, Montana, additional tests inspired by the moderate flows of gas obtained in 1914 resulted in the completion of a well east of the city in November which was estimated to be capable of yielding 15,000,000 cu. ft. of gas per day. Distribution of this gas to consumers in Havre was commenced before the end of the year.

As a result of the overproduction of petroleum in 1914, field activity in California was reduced to the lowest practicable minimum in 1915. In the Midway-Sunset district the Miocene No. 2 well ceased flowing in March, and from then to the end of 1915 no wells of corresponding size were completed. North of McKittrick in section 35, township 27 south, range 20 east, of the Mount Diablo meridian, a new field of 35° Baumé oil was opened by the completion of well No. 4 of the Belridge Oil Co., on April 8 at a reported depth of 4,000 feet. Other wells were started on adjoining sections, but the extent and value of the field remained unproved at the end of 1915. At Coalinga the deepening of an old well in the white-oil district adjacent to Oil City in December was attended with such favorable results that a revival of activity in this area is assured. The oilfields south of the Tehachipi range displayed more activity in 1915 than the San Joaquin valley fields. In the Coyote Hills north of Fullerton a number of flowing wells were completed. To the northeast in La Habra valley, near Brea and Placentia, developments were equally successful.

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Rights-of-Way for Irrigation Works Across Government Land*

By LEONARD LUNDGREN†

In 1891 Congress authorized the President to set aside timber reserves, as the National Forests were then called, in order to protect the remaining timber on the public domain from destruction and to insure a regular flow of water in the streams. The first, the 'Yellowstone Park Timber Land Reserve,' was created by President Harrison that same year, and later presidents have created others until at present the total net area is approximately 157,000,000 acres. Within the Forest boundaries are also some 21,000,000 acres in private ownership, consisting of lands entered for one purpose or another before the Forests were created, or of homestead entries made since.

Congress made it the duty of the Secretary of the Interior to prescribe regulations which would insure the fulfilment of the objects desired in creating the reserves. All the resources of the Forests needed to be given careful consideration and plans devised for their best development. Technical problems were involved which the officials of the Interior Department felt to be outside of their province. They therefore requested the aid of the experts of the Department of Agriculture as advisers, and soon recommended the transfer of administration of the reserves to the latter Department. This transfer took place in 1905. The following year the name 'Forest Reserves' was changed to 'National Forests' to indicate that their resources were not locked up as reserves for future use.

Land more valuable for agriculture than for the production of timber is excluded from the National Forests so far as is possible. Final adjustment of boundaries is now being made and will be completed in the near future. Small tracts of land which cannot be thus excluded are open to settlement under the Forest Homestead Act of June 11, 1906. The proportion of land within the Forests more valuable for agriculture than for growing of timber or other purposes is trifling. Practically all such land has already been taken up, and the chances offered prospective settlers outside of the National Forest boundaries are better than within the Forests. The Forest Service encourages bona fide settlement on the National Forests because the settlers help to fight fire and assist the Forest officers in many ways.

Oregon has a total area of 61,887,000 acres, 13,260,000 being National Forest land, of which 2,500,000 acres are mountainous and barren. Since the Forest Homestead Act of June 11, 1906, was passed 121,300 acres have been homesteaded in Oregon. There are over 1000 special use permits and easements now in effect in Oregon covering an area of more than 106,000 acres and a length of right-of-way of more than 1400 miles. Of the 2,900,000,000,000 board feet of standing commercial timber in the United States 546,000,000,000 is in Oregon. One-fourth of this, or 136,000,000,000, is in the National Forests.

It must be understood that public lands cannot be legally occupied until express authority for this purpose has been issued by the proper department of the Government. Many people erroneously believe that the mere filing of an application gives this right. Through the Acts of March 3, 1891,[1] as amended by the Act of May 11, 1898,[2] Congress has provided means whereby easements across public lands and National Forests for irrigation reservoirs and canals may be secured. Complete information regarding the securing of rights-of-way under these acts may be obtained in the pamphlet issued by the Department of the Interior and available to the public through the various local land offices. It should be understood that easements can only be secured on surveyed public land.

The Government must determine before granting a right-of-way whether or not the applicant has the legal right to receive such a grant. It must also determine if the applicant has initiated a right to secure the water, to utilize the right-of-way desired, and whether the proper technical studies for this purpose have been made. Field notes and maps are required so that the rights-of-way granted may be adequately protected by platting on the proper Government maps.

Applications for irrigation easements must be filed at the local land office of the district in which the project is situated. The application is then forwarded to the Commissioner of the General Land Office at Washington, who causes proper investigation to be made by the various branches of the Government such as the Geological Survey, Forest Service, and Reclamation Service, to determine if the welfare of the public will best be served by the granting or by the rejection of the application. The thoroughness of such investigation varies with the importance of the project, becoming rigid when various public interests appear to conflict. Sometimes this entails the examination of the financial ability of the applicant to complete the project, and of the engineering plans. These reports

*From address delivered before the Oregon Irrigation Congress, December 28, 1915.

†District Engineer, United States Forest Service, Portland, Oregon.

[1] 26 Stat., 1095.

[2] 30 Stat., 404.

Generated on 2024-09-30 01:12 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

are returned by the men in the field to their respective bureaus in Washington, who in turn make appropriate recommendations to the Commissioner of the General Land Office. The Commissioner then forwards the grant of the easement or the rejection of the application to the applicant through the local land office.

Congress has also provided through the Act of June 4, 1897, a means whereby legal authority may be granted by the Forest Service to occupy and use National Forest land either surveyed or unsurveyed. Revocable permits may be secured more quickly than easements under the Act of 1891 as amended by the Act of 1898, as the requirements and the procedure are less complicated and the permit is issued by local authorities. An application must be filed with the Forest Service for a permit under the Act of June 4, 1897, or the Act of February 15, 1901, if any unsurveyed National Forest land is to be occupied, as Congress has provided no means for the granting of an easement in this case.

When a project occupies surveyed public land and unsurveyed National Forest land and an easement is desired, applications should be filed with the local land office and the local office of the Forest Service. If a grant and permit are then issued the grantee will have a prior right for a permit on the right-of-way covered by permit when the public land survey is extended over the unsurveyed land under the project. Action may be greatly expedited if applicants appreciate the necessary routine and co-operate with the field officers of the Government. I am glad to say this is heartily given by practically all irrigators who mean business.

FRICTIONAL RESISTANCE OF SHIPS

In the Proceedings of the Society of Naval Architects and Marine Engineers, W. Mc. Entee discusses frictional resistance of ships. Attempts have been made to reduce this resistance by lubricating the under-water surface or by polishing with various materials. One favorite method used for racing yachts is to polish the bottom with black lead or graphite. An investigation of the benefits to be expected from such polishing or lubrication has recently been made with friction-planes at the model basin of the United States Navy. The planes were of wood, roughly $\frac{3}{4}$ in. by 2 by 20 ft., with ends sloped forward at an angle of about 30 degrees. Trials were made with planes coated with shellac, black lead, ivory soap, heavy cylinder-oil, and light cylinder-oil. The results of the experiments indicate that no advantage over a smooth varnish on shellacked surface is obtained. For each lubricating-surface the resistance is greater than for the shellacked surface. The resistance increases in the following order: black lead, light engine-oil, ivory soap, heavy cylinder-oil. The black lead gives nearly as low a resistance as the shellac, but is easily rubbed off when the surface is wetted, so that any effect is soon lost.

COMMISSION FORM OF GOVERNMENT IN THE UNITED STATES

In 1915 the commission form of government was in effect in 81 of the 204 cities in the United States of over 30,000 inhabitants, the largest being New Orleans whose population is estimated at about 365,000. Buffalo, with a population of about 460,000, has voted to inaugurate this system on January 1, 1916. Next in order are Washington, with nearly 350,000 inhabitants, Portland, Oregon, with about 260,000, and Denver, with about 250,000. In these cities the commissions range in size from three to seven members. Those in St. Paul and Omaho have seven members each; those in San Diego and Fort Worth six each; and that in Huntington, West Virginia, four. All the other commissions are composed of either three or five members, the great majority having five. The salaries paid municipal commissioners range from $500 per annum in Jackson, Michigan, and Springfield, Ohio, to $7000 per annum in Birmingham, Alabama, and their terms of office vary from one to four years.

Dayton, Ohio, has a commission of five members, which decides matters of general policy, and a 'city manager,' appointed by the commission, who looks after the administrative work. The presiding officer of the commission receives $1800 per annum, the other members $1200, and the city manager $12,500.

The larger cities still cling to the older form of government by mayor and council. In all, 123 cities of over 30,000, including all those having more than 500,000 inhabitants, are governed in this manner. The mayors' salaries range from $100 per annum in Flint, Michigan, to $15,000 in New York City, and their terms of office from one to four years.

PROPOSED DAM AND POWER PLANT AT EDMONTON, ALBERTA

The Edmonton Power Co. is planning to build a solid concrete dam, 1500 ft. long and 100 ft. high, on the Saskatchewan river, above Rocky Rapids, making an artificial lake about 60 square miles in area. Electricity will then be generated in a power plant below the dam and brought to Edmonton by a steel-tower transmission line. At Edmonton this electricity will be 'stepped down' in the company's substation and will be sold in bulk to the city to deliver to the various departments and consumers as at present. The company is not to be granted a franchise within the city and will have nothing whatever to do with the civic departments or private consumers.

The project will cost approximately $6,000,000, not including an electric railway, which will be built from Edmonton to the proposed power-site as a separate scheme. The railway will develop and make tributary to Edmonton a rich mixed-farming, timber, and pulpwood district. The construction of the electric railway and complete power development will take at least four years.

Generated on 2024-09-30 01:12 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Government Bulletin on Concrete Highways

The mileage of concrete pavements in the United States has increased rapidly, and it is likely to continue to increase, according to Bulletin No. 249 of the United States Department of Agriculture, 'Portland-Cement Concrete Pavements for Country Roads.' This bulletin gives the estimated amount of concrete pavement in the United States in 1914 as 19,200,000 sq. yd. In 1909 it was only 364,000 sq. yd.

The principal advantages of concrete pavements which have led to this increase in popularity are:

(1) Durability under ordinary traffic conditions.

(2) A smooth, even surface offering little resistance.

(3) Absence of dust and ease with which it may be cleaned.

(4) Comparatively small cost of maintenance until renewals are necessary.

(5) Availability as a base for another type of surface if desirable.

(6) Attractive appearance.

In commenting upon these advantages, the bulletin states that the durability of concrete roads has not yet been proved by actual practice, because those which have been built are still comparatively new, but from the condition of those which have undergone several years' service, it seems probable that they will be found to wear well.

The disadvantages of concrete as a road surface are:

(1) Its noise under horse traffic.

(2) The wearing of the necessary joints in the pavement; and the tendency to crack, with the consequent rapid deterioration.

(3) The difficulty of repairs when these become necessary.

In this connection it may be noted that the disadvantages mentioned in the bulletin have been largely overcome, at least for climatic and other conditions in California, by the omission of expansion joints except at the end of a day's work and by the use of a wearing surface composed of asphaltic oil and screenings.

For a successful concrete road, hardness, toughness, and uniformity are the most essential qualities. These can be secured to a great extent by care in the selection of the constituent materials and the proportions in which they are mixed. Sample specifications are included in the bulletin. These specifications are believed to embody the best engineering practice as it has been developed up to the present time. They cover such points as materials, grading, sub-grade, and construction.

The cement should conform to some standard specifications for portland cement, such as those issued by the United States Bureau of Standards or the American Society for Testing Materials. The sand should not contain more than 3% of foreign material. Sand with coarse rather than fine grains is to be preferred. The coarse aggregate may be either crushed stone or gravel and should be well graded in size between proper limits.

The proportion of cement to the sand and coarse aggregate combined should not be less than about 1:5, and the proportion of sand to coarse aggregate not less than $1\frac{1}{2}:3$, nor greater than 2:3. A useful formula when gravel is used as coarse aggregate is 1 cement : $1\frac{1}{2}$ sand : 3 gravel. When crushed stone is used, $1\frac{3}{4}$ parts of sand may be used instead of $1\frac{1}{2}$ parts.

In addition to discussing the engineering details of construction, the bulletin already mentioned calls attention to the fact that ordinarily from $\frac{1}{3}$ to $\frac{1}{2}$ of the total cost of constructing a concrete pavement is for labor after the materials are delivered. This emphasizes the importance of efficient organization and proper equipment. Failure to take these factors into consideration frequently results in adding from 10 to 20% to the cost of a concrete pavement with no corresponding addition to its durability.

The most economical method is to have the work of mixing and placing the concrete as nearly continuous as practicable. The work should be planned with a primary view of keeping the mixer going full time. The drainage structures, the grading, and the sub-grade should be completed well in advance of the mixer and provision made for obtaining all of the necessary materials without delay. A common error is the failure to make adequate provision for delivering water on the work, and the amount which a given stream is capable of supplying is frequently overestimated.

Maintenance of concrete roads in Milwaukee county, Wisconsin, was discussed by Herbert J. Kuelling, highway commissioner, in a paper presented before the Road Congress at Worcester, Massachusetts. Small depressions are cleaned carefully, filled with hot tarvia, and covered with coarse sand or screenings. Two methods are in use for repairing larger depressions. Where a quick repair which will not interfere with traffic is desired, the defective spot is cleaned and painted with tarvia-X. It is then filled to grade with crushed stone and tamped. The voids in the stone are filled with a bituminous binder, about one gallon per sq. yd. per in. of depth. The other method is to cut out the defective concrete entirely, trim the sides of the hole, and fill it with new concrete. There are 921,000 sq. yd. of concrete pavement on the highways of the county, and it is proposed to lay 350,000 sq. yd. more during the coming year. The pavements are 16 or 18 ft. wide, 8 in. thick in the centre, and 6 in. thick at the sides of the road.

Generated on 2024-09-30 01:13 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Earth Roads on Light Soils

The construction and maintenance of earth roads on light soils, particularly those in irrigated and other arid regions, is described in the *Reclamation Record* by Andrew P. Anderson of the Office of Public Roads and Rural Engineering. A light soil is defined as one which is of fine texture and is so lacking in adhesive qualities as to be readily eroded either by strong winds or flowing water, and which becomes dusty under even light traffic in dry weather.

Climatic conditions, amount and distribution of rainfall, prevailing winds, local traffic problems, distribution of material, and financial resources must all be taken into consideration. Furthermore, the varied behavior under traffic of soils that appear in every way identical and sometimes separated but a few rods of distance, must be considered. If grading is done, those sections which stand up well under traffic should not be covered with loose soil that will not pack, but the process should be reversed as much as possible, and those soils which show the highest resisting power should be extended and utilized as a surfacing to cover the looser and more troublesome ones as far as possible.

Before undertaking any considerable surface improvement, a careful investigation should be made of available deposits of clay or gravel. In general, even a slight surfacing of clay or some other adhesive soil, when thoroughly mixed and worked into the original soil, will produce a great improvement. Gravel containing from 10 to 20% of clay or other adhesive material will, in general, make an excellent surfacing material. Frequently clay or gravel, or both materials, are encountered in even comparatively shallow cuts made for the purpose of grade reduction and these may be hauled to other parts of the road.

The actual shape of the cross-section of the road will be governed by local conditions. In general, the crown should be kept low and the ditches wide and shallow, unless there is special danger from seepage, when the depth of the ditches may be increased as necessary. Deep ditches and a high crown facilitate the escape of moisture, while the aim in general must be to conserve it as much as possible. So long as the soil can be kept damp or moist it will stand considerable traffic. Flooding the worst part at least may sometimes be advisable. The best practice is to provide for the flooding of one side of the road at a time, except in certain soils in which the rate of lateral percolation is rapid, where simply flooding the side ditches at certain intervals might prove sufficient. Furthermore, all grading or any work which involves any considerable disturbance of the road surface must be done immediately before or during the rainy season, unless irrigation water is available for flooding, as the light soils require relatively large amounts of water to consolidate them.

In order to prevent undermining and washouts of the culverts and cross-drains during heavy storms substantial means must be provided to prevent erosion. Special care should, therefore, be given to the foundations and to the size of waterways. The waterway should be large enough to insure the passage of the greatest flood without overflowing the road. Substantial end or wing-walls are, in general, necessary to protect the embankment, while cut-off walls or riprap may be used to prevent erosion under or around the foundation. Culverts should always be constructed with an idea of permanence and placed so as to serve for such future improvements of the road surface as may be necessary or desirable.

The difficulty of maintaining an earth road on light soils will depend materially on the amount and distribution of the rainfall, together with the amount and character of the traffic. During such periods as the rainfall is sufficient to keep the soil in the roadway moist, intelligent and systematic use of the split-log drag or other similar device will serve to maintain the road in at least reasonably passable condition under ordinarily farm traffic. But dragging such roads has little or none of the cumulative effect that it has on most clay roads. The clays and most other heavy soils will puddle and harden on drying if they are worked when wet, but practically the only binding power in the light soils is the capillary moisture. When the road becomes dry this binding power is lost. Maintenance of this class of road must therefore be directed toward retaining the soil-moisture, incorporating with the surface soil some natural binder, such as clay or adobe, or adding some temporary fibrous binder from time to time, as straw, sage brush, etc. If straw or similar material is used, it should be applied in a uniform layer about one inch deep and covered with sufficient soil to prevent it from blowing away. Any chuck-holes which may develop should be immediately re-treated in the same manner. The drag should never be used on a dry road.

Casing-head gasoline was produced in 10 States in 1914, but over 99% of the output came from Oklahoma, West Virginia, California, Pennsylvania, Ohio, and Illinois in the order named. The average yield per thousand cubic feet of gas ranged from 1.48 gallons in California to 3.01 gallons in Oklahoma, with a general average of 2.43 gallons. The total production was 42,652,632 gallons, and the value $3,105,909, or $0.0728 per gallon. The production in California was 7,581,309 gallons, and the value $633,517, or $0.0836 per gallon.

Generated on 2024-09-30 01:15 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Use of Water-Gas Tar and Coal Tar for Protecting Concrete

Protecting concrete which is subjected to high velocities of water by coating with water-gas tar and coal tar is discussed in the *Reclamation Record* by Charles H. Paul, engineer in charge of the construction of the Arrowrock dam.

The regulating outlets through the dam are molded in 1:2 portland-cement mortar, except for the 28 ft. next to the upstream face of the dam, which is lined with semi-steel pipe. These outlets are 4 ft. 4 in. diam. and are subjected to velocities of 60 ft. per second or higher. Wood-pipe staves were used for lagging the forms, and great care was used to secure a smooth and straight surface. The upper outlets are 70 ft. and the lower ones 130 ft. long. After the removal of the forms, they were trimmed, scraped, and washed with grout in the usual way. They were then painted with two coats of water-gas tar and two coats of coal tar—the same combination that has been used for several years for painting metal that is to be subjected to the action of water.

The idea at Arrowrock was not so much that of waterproofing as to fill all the minute voids in the surface of the outlets, so as to prevent the erosion caused by the formation of a vacuum in small voids or pockets. Preliminary experiments had indicated that the water-gas tar would penetrate the concrete, and that the coal tar would follow it in and bind to the concrete much better than if it were applied direct. In this way the voids at and near the surface were filled and the concrete was smooth, with a fairly durable finish, which was also cheap and easy to apply.

This coating was applied to all outlets during the fall of 1914. Five of the lower outlets, and six of the upper outlets were in service during the irrigation season of 1915, some of them operating for 4½ months under heads as great as 100 ft., with corresponding velocities up to 64 ft. per second. The outlet that was used most was operated nearly all the time with its valve only partly open, which is a less favorable condition than with the valve wide open. After this service, careful inspection was made and the tar coating was found to be in excellent condition. In a few small spots the outer coating had come off, but even there the concrete surface was well filled with the tar and was still well protected, apparently, against water action.

It is important that the water-gas tar be of a thin consistency. The manufacturers can supply an oil for thinning this tar, and it is advisable to have some oil on the job in case it is needed, but it is believed that the success of the whole operation depends upon the thin, water-like consistency of the water-gas tar. Both the water-gas tar and the coal tar should be refined.

It is necessary to have the concrete thoroughly dry at the time the first coat is applied. The water-gas tar may be applied without heating, and the second coat may follow the first immediately. The first coat of coal tar may be applied as soon as the water-gas tar has soaked in a little, but the second coat of coal tar should not be put on until after the first coat has set. Both coats of coal tar should be used hot and spread as thin as possible, as a thick coating is much more likely to peel and run.

The approximate cost of painting 1000 sq. ft. of surface in a 52-in. diam. outlet with two coats of water-gas tar and two of coal tar as described herein was as follows:

Labor, 4½ days, at $2.50	$11.25
Material:	
12 gallons water-gas tar, at $0.16	1.92
15 gallons coal tar, at $0.16	2.40
Brushes and miscellaneous	1.43
	$17.00

Both kinds of tar were obtained from the Barrett Manufacturing Co. for $4 per barrel of 50 gallons f.o.b. Chicago. Freight to Boise was about $4 per barrel.

NATURAL GAS FROM ARTESIAN WELLS IN CALIFORNIA

A recent report on the mineral resources of the San Joaquin Valley counties issued by the California State Mining Bureau describes the natural-gas wells in the vicinity of Stockton. The depth of the wells ranges from 1400 to 3200 ft. The first well was drilled for artesian water, and all of the wells produce water along with the gas. The flow of gas varies more or less directly with the flow of water. In consequence of this, many of the wells are now being 'forced' by turning the gas back into the well, which results in an increased flow of water, and in its turn, in an increased flow of gas.

The principal combustible constituent of the gas is marsh-gas (CH_4), the proportion ranging from 55% to 75% in the different wells. An analysis of some of the richer gas showed approximately 800 B.t.u. per thousand cubic feet. Most of the wells produce from 10,000 to 100,000 cubic feet of gas per day. There are two companies that market the gas to consumers, one owning two, and the other twelve wells. There are also several wells owned by individuals who use the gas locally.

Natural gas is also obtained from a number of artesian wells in Kings county in the vicinity of Tulare lake. Most of the wells are around one thousand feet in depth. The gas is in small amounts and is used locally on the ranches where it is found for domestic purposes and for running gas-engines.

Generated on 2024-09-30 01:12 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Important Topping Plants of California*

By ARTHUR F. L. BELL†

In the early days of the oil industry in California, most of the output was a heavy fuel oil. About 1905, however, the light oil from the Santa Maria field began to be a factor. A few years later large amounts of light oil began to be produced in the Midway field, and about the same time there was a large increase in the output of light oil from the Fullerton field.

This is shown in the following tabulation of California's production:

Year	Barrels	Below 20° Baumé, %	Above 20° Baumé, %
1908	48,307,000	90	10
1910	77,698,000	80	20
1912	90,075,000	69	31
1914	103,600,000	47	53

The increasing production of light oil with a low flash-point and the demand for refined products necessitated the use of some cheap and efficient means of separating the lighter elements either in the field or at the main distributing points. It also became necessary to remove the large proportion of water which many of the light oils carried in emulsion.

Probably the first important attempt to top light oil in California by other means than the ordinary stills was tried by the Union Oil Co. about 1908, with Santa Maria oils, at its plant at Port Harford. The process was the invention of Hubert G. Burroughs who afterward obtained a patent for the process, No. 998,837, dated July 25, 1911. The plant consisted of a series of 12-in. pipes mounted in units of two or three pipes, one above the other. The crude oil was admitted to the upper pipe and filled the pipe about two-thirds of its diameter at which point it overflowed to the next 12-in. pipe below and in the same manner the oil again flowed to the third pipe below. Superheated steam was the heating agent, passing through endless coils in the lower half of the 12-in. pipes. The oil was heated to about 200° F. in the upper pipe and reached a final heat of about 325° F. in the bottom pipe. The vapors generated passed off through the vapor-line to the condenser.

The gravity of the crude oil ranged from 23 to 24 degrees Baumé. When the plant was started the crude oil contained from 2 to 3% water, but later the water increased to 25 to 30%. The plant was operated for two or three years but the system developed several objectionable features. It was not economical; was limited in capacity; and when the water in the Santa Maria oils increased to such an extent that it could not be removed by ordinary means, and had to be passed through the topping plant, the capacity of the plant was so decreased that it was abandoned.

A new plant was erected under the design of E. I. Dyer, chief engineer for the Union Oil Co. This plant, of which A. Roy Heise is superintendent, is at Avila, near Port Harford, about 40 miles from the Santa Maria field, the oil being delivered to the plant from the field by two pipe-lines; one 6 in. and the other 8 in. diam. This plant, although designed several years ago, is still one of the best topping plants on the Coast. It is topping oils in some cases carrying as high as 20% water at the same cost for fuel and labor as some other plants topping oils carrying only 2 or 3% water.

The plant has a capacity of about 10,000 bbl. per day of clean oil or 8000 bbl. of net oil carrying 20% water. The oil from the field carries a larger proportion of water, but a portion of it is directly treated in an electric apparatus, manufactured by the Petroleum Rectifying Co. of California, the oil thus treated being brought down to about 5%, which when mixed with the rest of the oil coming from the field, gives an average of about 18 to 20% of water in the oil handled by the topping plant.

The heat used in topping comes from steam at 150 lb. pressure generated by a battery of five 300-hp. Stirling boilers in a separate boiler-house. There are 12 cylindrical steam-stills mounted in a steel-frame structure in a separate building, the stills being mounted in a double row of six each, one row above the other. Those in the upper set are known as the low-pressure stills, those in the lower as the high-pressure stills. Live steam is admitted to the lower row only, the steam passing into the body of the still by a number of 1-in. return pipes.

Each steam-still is about 6 ft. in diameter and 20 ft. long and has a steam-chest mounted on its front end having three separate compartments. The live steam is admitted to one compartment and passes to the next compartment through a series of 1-in. continuous pipes. These run from the initial side of the steam-chest the full length of the still, and return to the next compartment of the steam-chest, and in the same manner to the third compartment, so that there is no connection of live steam between any of the compartments of the steam-chest except through the heating-coils. The condensed water is trapped out of each compartment so that a minimum quantity of condensed water travels through the coils.

As the steam is condensed, it drains to traps and

*From paper delivered at the San Francisco meeting of the American Institute of Mining Engineers, September, 1915.

†Chief Engineer, Associated Oil Company, San Francisco.

Generated on 2024-09-30 01:13 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

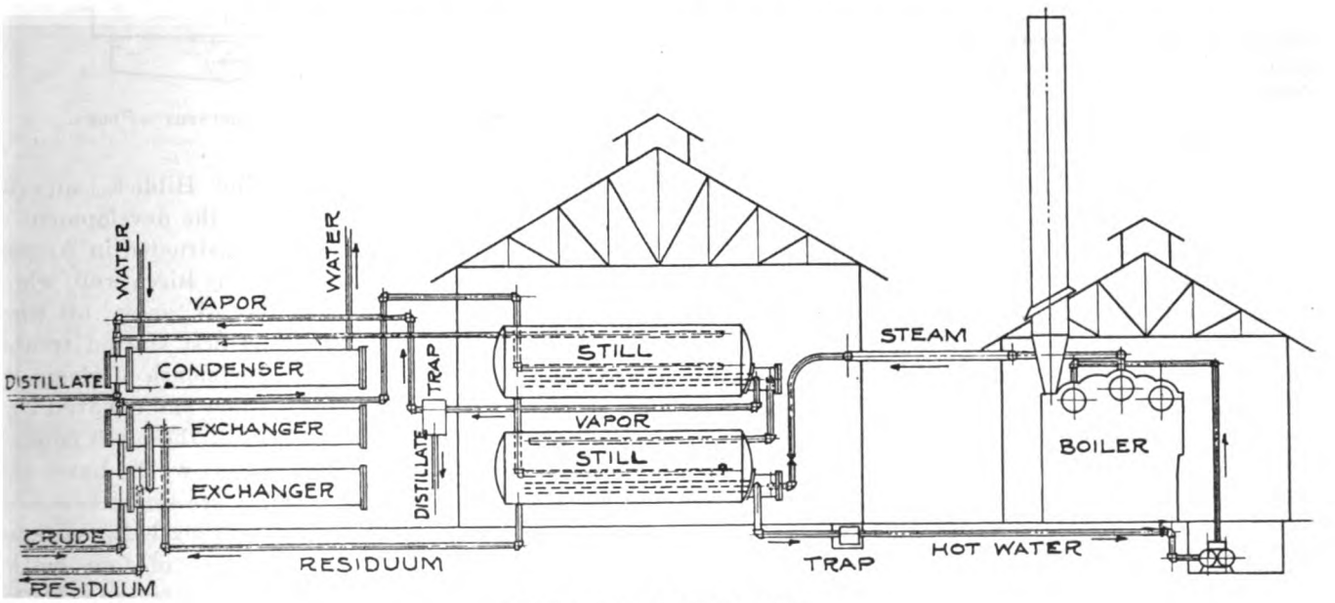
is returned to the boilers at 280° F. No live steam is admitted to the upper tier of stills, the heating agent being the vapor from the bottom still, which rises and enters the steam-chest of the upper still and passes through the still in the same manner as the live steam entered the lower still. The vapor pressure in both the lower still and inside the coils of the upper still ranges from 40 to 50 lb. The pressure is maintained at a point where the radiation of the latent heat through the coils to the liquid in the upper still is equalized by the heat from the vapor rising from the lower still. As about half of the vapor is steam, the temperature corresponds closely to that of saturated steam of the same pressure. No vapor leaves the coils of the upper still. Only the condensed liquids are trapped off. These go to the same condenser as the vapors from the low-pressure still. By this means all the latent heat in both the oil and water vapors is absorbed by the oil and water in the upper still, thereby effecting a saving of about 50% of the fuel necessary to top the oil in ordinary stills. The vapors from each low-pressure still flow into the condenser belonging to that battery, which is mounted on the top of a steel framework outside of the steam-still house.

There are six separate condensers, each connecting to a battery consisting of a high and a low-pressure still. The condensers are rectangular. They have a vapor-chest at the rear end of the same general design as that of the steam-stills, except that the dividing partition in the chest is horizontal. The vapors are admitted to the upper portion of the chest and pass through a series of 2-in. return pipes, surrounded by the condensing water, returning to the lower portion of the chest. From this point they drain to the proper storage tanks.

Mounted below each condenser are two heat exchangers set one above the other. These heat exchangers are similar in construction to the condenser except that they have 1-in. return pipes, and have two vertical dividing partitions in each chest. In addition, heated residuum surrounds the pipes instead of water. The heated residuum from the high-pressure still passes into one end of the body of the upper exchanger and travels backward and forward four times, guided by interior partitions. It then passes into the end of the body of the lower exchanger, again traveling backward and forward four times before passing out as finished residuum to storage. In all condensers and exchangers, the liquids counterflow.

The crude oil in taking up the heat in the exchangers comes into one side of the chest of the lower exchanger, passes backward and forward twice through a series of 1-in. return pipes and then is discharged from the opposite side of the chest to the upper exchanger. It passes through two series of return-bend pipes in the upper exchanger, leaving the chest on the opposite side from where it entered. It flows to the low-pressure still, and after giving off a proportion of its vapors of oil and water, is pumped to the high-pressure still where practically all of the remaining distillates are taken off. The treated oil from six high-pressure stills passes to the exchanger.

This is an economical system. Practically the only steam admitted to the plant is through the high-pressure stills, so all of the work done in the low-pressure stills is an absolute saving. The plant is running on what is known as double effect. At times it has been run on triple effect, that is, live steam was introduced into the first still only and the heated vapor from the first still under pressure was admitted to the coils of the second still, and the heated vapor from the second still, necessarily under a lower pressure, was admitted to the coils of the third still, the crude oil flowing first to the low-pressure, then to the intermediate, and finally to the high-pressure still. As might be expected, this method showed a greater saving than with double effect, but



UNION OIL CO. PLANT AT AVILA.

Generated on 2024-09-30 01:21 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

reduced the quantity of crude oil that could be treated in a given time.

DISTILLATION BY DOUBLE EFFECT.

	Water, %	Distillate, %
Evaporation from low-pressure still...	56.95	34.45
Evaporation from high-pressure still..	42.05	64.15
Evaporation interchanger and unaccounted.	1.00	1.40
	100.00	100.00

DISTILLATION BY TRIPLE EFFECT.

	Water, %	Distillate, %
Evaporation from low-pressure still...	55.80	37.42
Evaporation from intermediate still...	29.75	31.36
Evaporation from high-pressure still..	13.42	29.74
Evaporation from interchanger and unaccounted	1.03	1.48
	100.00	100.00

From the above figures, it will be seen that with the double-effect arrangement about 50% of the fuel is saved, and with triple effect about 75%, over a single system of evaporation.

For a given period, the average temperature of the crude oil entering the heat exchangers was 61.67° F.; leaving the heat exchangers before entering the low-pressure stills, the temperature was 141.45° F., showing a saving by rise in temperature due to exchangers of 79.78° F.

The economy of the plant is shown by the following table:

DUTY RECORDS PER BARREL OF DRY FUEL OIL USED FOR THE LAST THREE MONTHS OF 1914.

Barrels of crude oil treated.....	63.35
Barrels of water actually removed from crude.....	10.67
Barrels of residuum produced.....	42.34
Barrels of distillate produced.....	8.54
Barrels of residuum pumped from plant.....	43.80
Barrels of distillate pumped from plant.....	9.52
Barrels of circulating water pumped.....	156.46
Barrels of miscellaneous oil pumped.....	9.08
Kilowatt hours—lighting, power, etc.....	2.53

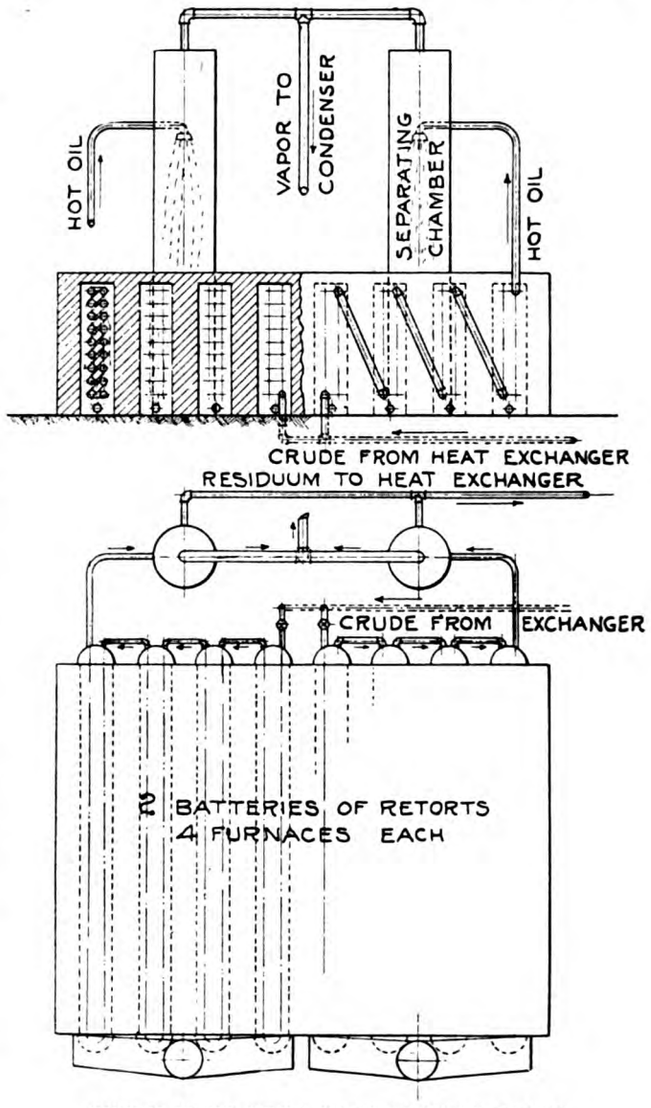
THERMAL DUTY OF 1 BBL. OF DRY FUEL OIL.

	B. t. u.
Evaporating water from crude oil	4,135,984
Evaporating distillate from crude oil.....	425,128
Kilowatt hours—lighting and power.....	35,940
Total useful duty	4,597,052

The average proportion of water in the crude oil was 18.71%.

This system is ideal for Santa Maria oils and entirely eliminates the coking which takes place when direct heating is used under ordinary stills or retorts. The water carried by the oil is as salty as sea-water and when evaporated throws down salt crystals in the stills. In the case of fire-heated stills, this salt mingles with the coke and forms a hard incrustation, which necessitates closing down frequently and chipping out the coke; whereas with this form of still, when salt crystals are formed, the operators employ the unique method of shutting down the stills about once a week, emptying the stills of oil and filling with water and then heating the water, thus dissolving the salt and passing it off by pumping a continuous stream of heated water through the stills. Two patents on this system have been applied for by Mr. Dyer and are now pending in the patent office.

The Union Oil Co. has two other topping plants situated in the Fullerton field. The most important



TOPPING PLANT, UNION OIL CO. REFINERY AT BREA.

is the Brea refinery, A. Edmund Hildick, superintendent. This plant shows clearly the development of the art of topping, having been constructed in August, 1911, to handle the light oil from the Birch well, which produced about 2400 bbl. per day of 'gassy' oil when first completed. The plant when first started treated successfully about 100,000 bbl. per month of clean dry oil carrying not more than 0.5% water and removed 22% of 53° Baumé tops. The old part of the plant consists of eight old 40-hp. drilling-boilers, which have half the tubes removed. These boilers are set in two rows of four, facing each other with an alley between them. The oil is run through each battery of four boilers continuously. It has since been demonstrated that this

Generated on 2024-09-30 01:12 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

plant is not adapted to handling wet oils and will not work successfully with oils carrying more than 2% water.

The next step in increasing the capacity of the plant was the building of an additional topping plant in March, 1913. This consisted of two batteries of retorts, each battery being divided into two separate divisions, each division having four furnaces and each furnace carrying a double row, 9 pipes high, of 3-in. return pipes, 20 ft. long. Each division of the battery is fed with crude oil independently. The oil admitted to the bottom pipe of the furnace travels up through the nine coils, coming out the top and returning to the bottom pipe of the next furnace, again leaving the upper pipe and so on through the four furnaces. The heated oil from each side of the battery flows by independent pipes to one of the separators. This makes each 8-furnace battery with one separator a single unit.

The vapors are then led from the separating-chambers to the condensers and on to the storage tanks. The residuum is taken from the bottom of the separators, passed through the heat exchangers and on to the residuum storage.

The coils in the furnace are heated by gas-fed perforated pipes running the full length of the furnace. It was found that this form of furnace is not well adapted to oil firing. A change was, therefore, made in one of the batteries, the coils being mounted horizontally in a brick furnace, allowing plenty of combustion room below. This furnace is working satisfactorily and it is likely that the other half of the battery will have the coils changed from vertical to horizontal position so as to be adapted to oil firing.

The total capacity of the two batteries of retorts with gas fires was 60,000 bbl. per month of 21 to 22° Baumé oil, carrying 6% moisture and basic sediment. From this there was topped about 10% of 51° Baumé distillate, giving a residuum of 18° Baumé, having a flash-point between 160 and 180° F. With the change in construction and the use of oil firing, it is believed the capacity will be doubled.

The oil just before entering the separator is choked down to a pressure of 40 lb., but flows into the separator at practically atmospheric pressure. This choking of the oil gives a back pressure at the inlet end of the retorts at the furnace of 80 lb. The crude oil leaves the heat exchanger and enters the first coil of the retort at 180° F.; it leaves the coils and enters the separators at about 450° F. This refinery not only tops oil but turns out finished gasoline, but as the purpose of this paper is to describe topping plants only, no description will be given of the other details of the plant.

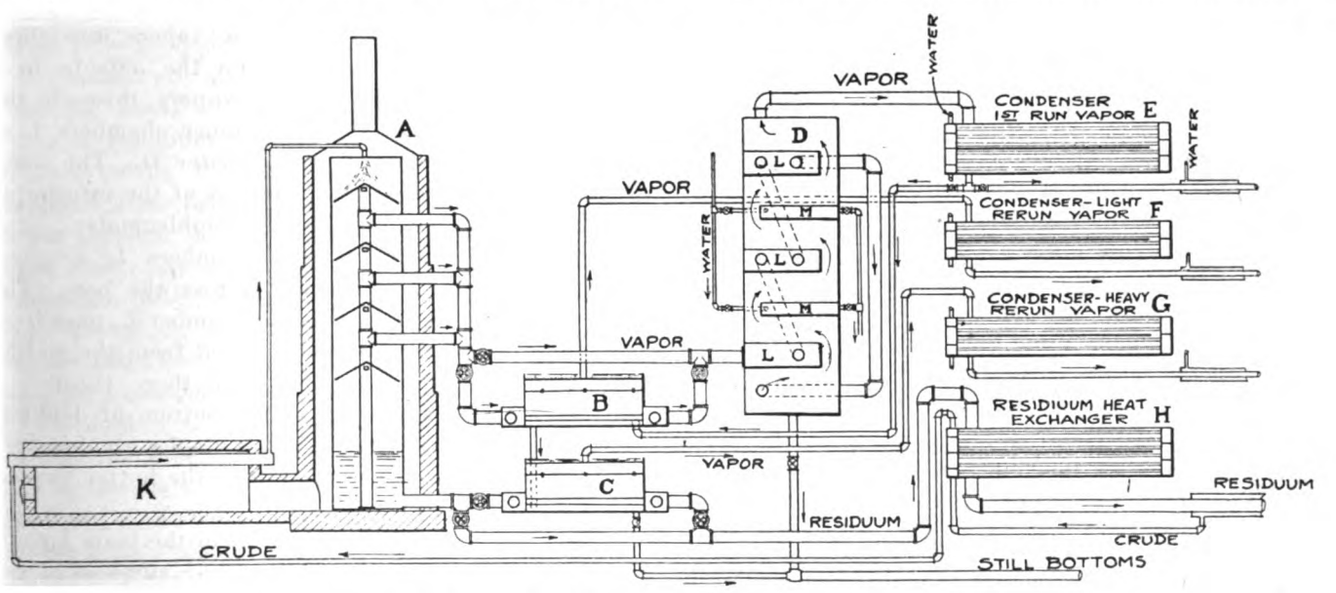
In 1912 the General Petroleum Co. completed an 8-in. pipe-line from the Midway oilfields to San Pedro. As the oils transported were too light and too valuable for fuel purposes, it was necessary that a topping plant be erected at or near the terminal. The company adopted the Trumbull system of topping and erected a plant of 25,000 bbl. daily capacity (this being the capacity of the line when pumping light oil) at Vernon, near Los Angeles. All incoming oil is topped here and the residuum pumped to San Pedro. However, while this plant has a rated capacity of 25,000 bbl. per day, it has since been determined that the most economical capacity of the plant is about 17,000 barrels.

The average gravity of the oils handled is 20° to 21° Baumé; residuum, 16° to 17° Baumé; of the tops, No. 1, 55° and 58° Baumé, No. 2, 45° Baumé and still-bottoms, 35° to 37° Baumé.

Special 'cuts' of various gravities are also manufactured to order.

TEMPERATURES MAINTAINED AT PLANT AND PROPORTION OF OIL AND WATER

Crude run to heat exchangers	80° F.
Heat exchangers to retorts	264° F.
Out of retorts	445° F.



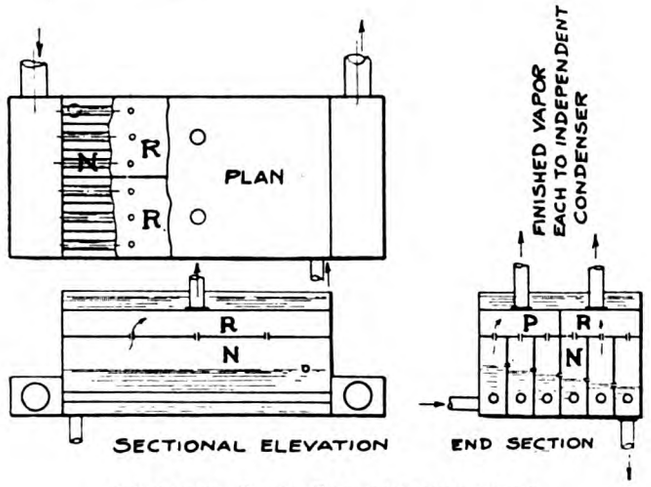
TRUMBULL TOPPING PLANT OF GENERAL PETROLEUM CO. AT VERNON.

Generated on 2024-09-30 01:15 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Residuum to storage	190° F.
Water in oil	0.5%
Fuel consumed	1.6%

The last item does not include oil consumed in pumping about the refinery, this being done from the main pipe-line pumping station, and by auxiliary electric pumps.

The Vernon plant was completed in 1912, at a cost of about $80,000 and has been in continuous successful operation since that time. The plant consists of two independent batteries, each battery having two retorts discharging into a single evaporating-chamber.‡ Each battery has two separator boxes, where the condensed



SEPARATORS *B* AND *C* IN TRUMBULL PLANT.

distillates are re-run into finished products; also three heat exchangers about 4 ft. in diameter with 18-ft. tubes; two first-run vapor-condensers of approximately the same size; and four re-run vapor-condensers 30-in. in diameter with 18-ft. tubes. In addition to the condensers, there are water-jacketed coolers consisting of one or two small pipes laid within a larger pipe for the purpose of further cooling the distillates before going to the storage tank.

In this plant, tubular condensers and water-jacketed pipe coolers have been used in every case instead of the ordinary condensers generally used about a refinery.

Since the plant was built, it has been found advisable to make several changes and additions; one important change being in the retorts. The original retort consisted of six 12½-in. pipes about 20 ft. long connected together at their ends with 4-in. pipe returns. Vent pipes were inserted at one end of each retort to lead off gases which would cause unequal heating and sagging of the retorts if trapped in the large pipes. It was found that there was not heating surface enough, the temperature of the escaping gases in the stack running as high as 1200° F. Additional 4-in. retort pipes were, therefore, placed above the 12½-in. pipes, thereby increasing the heating surface about 50%, the result being that the temperature of the escaping gases was reduced to 625 to 750° F. The company has lately torn down one of the retorts and rebuilt it entirely of 4-in. pipe. This change has resulted in a marked improvement. Another important feature added to the original construction is a large rectangular dephlegmater or re-evaporator erected at each unit through which all the first-run vapors pass. This dephlegmater, it is claimed, has improved the quality of the products by removing the heavier distillates which originally discolored them.

The special features claimed for the Trumbull process are:

The saving of heat in the evaporating-chamber by means of conical spreaders in the evaporators, all oil being forced to run down the inside surface of the shell, which is heated on the outside by the escaping gases.

The condensing of the first-run vapors and the re-evaporation of these distillates by passing them through a specially formed separator, which derives its heat from the inflowing first-run vapors.

The recovery of the re-evaporated distillates from separate compartments of the separator thereby furnishing different gravities of finished products as may be desired.

The course of the oil through a single battery of the Trumbull plant at Vernon is as follows:

The crude oil previously heated by passing through heat exchangers *J* and *H*, is then forced through the retort pipes. From there, it passes upward by a single pipe to the top of the evaporator *A*, and is sprayed over a conical spreader which directs the fluid down the inner surface of the shell. This heated oil comes in contact with additional conical spreaders in its downward course, continuously forcing it against the heated shell. The vapors separate from the hot oil in the evaporating-chamber and enter a vertical perforated pipe directly under the apex of the conical spreaders. This pipe delivers the vapors into three outlets which again terminate on the outside in a single down-pipe and lead the vapors through the upper separator *B* to the three inner chambers *L* of the recently constructed dephlegmater *D*. The inner chambers *L* are sealed from the rest of the interior of the rectangular box forming the dephlegmater.

Between each of the three chambers *L*, are two water-compartments *M* placed across the box. The incoming vapors enter the lower chamber *L*, pass from the lower to the middle chamber and from the middle into the upper chamber and from there through a pipe into the open portion at the bottom of dephlegmater *D*. These gases coming in contact with chambers *L*, which are completely filled with the hotter vapors, are re-heated.

As the re-heated vapors flow up in the main box *D*, they come in contact with the cooling surfaces of the water compartment *M*, which condense and throw

‡This chamber is called a 'separator' on all the plants described except in connection with the Trumbull plants where it is called an evaporating-chamber.

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

down the heavier distillates on to the heated surface of the chamber *L*, the latter evaporating any of the lighter oil, which might be entrained with the condensed heavier distillates. The result of this operation, it is claimed, is that all the heavy discolored distillates finally reach the bottom of the dephlegmater, while the light clean vapors pass onward and out of the dephlegmater to a battery of two large tubular water-condensers *E*, which are of similar construction to the residuum heat exchangers.

The distillate from condenser *E* flows to the separator *B* entering the bottom compartment at one corner, traveling forward and backward six times through a series of compartments *N*, heated by the hot vapors coming from the evaporator *A*. As the distillates flow through these heated compartments *N*, they are evaporated, the vapors rising through openings into either of the two upper compartments *P* and *R*, from each of which the vapors are led to two independent condensers *F*.

The outside upper portions of the separators *B* and *C* are water-jacketed, and as the hot vapors rise in the compartments *P* and *R*, any heavy distillate carried by the vapors is condensed and drops back into compartment *N*, so that only the lighter vapors escape from the respective compartments. The unevaporated distillates pass on to separator *C*, where they are treated in the same manner as in separator *D*, the vapors being conducted to two independent condensers *G*.

On account of the distillates being heavier in separator *C* than in separator *B*, the heat supplied is derived from the hotter residuum instead of from vapors. This arrangement of two separators with four independent compartments gives four separate re-run distillates of different gravities, without additional cost for fuel, the heat expended in doing this work being derived from the original heat absorbed in the retorts. The unevaporated distillate from separator *C* passes on with the heavy distillate from dephlegmater *D* to the storage tanks.

By-passes are arranged in both the vapor and residuum lines, so that all or only a portion of the vapor or residuum may travel through the separators; by this means, the required heat is obtained. The residuum after falling to the bottom of evaporator *A*, passes through the separator *C*, and on to a series of three heat exchangers, each exchanger having a diaphragm in the shell, which guides the oil backward and forward; it then enters the next shell and so on into the third shell from which it passes through water-jacketed pipe-coolers to storage.

The cold crude oil, entering these exchangers through the tube compartment at the end of the shell and by means of three diaphragms, is guided backward and forward through the tubes four times, this process being repeated through each of the exchangers, the crude entering the coldest exchanger and passing out of the hottest.

PORTLAND CEMENT INDUSTRY IN 1915

An estimate of portland cement produced in the United States in 1915, just made by Ernest F. Burchard, of the United States Geological Survey, indicates that the shipments from the mills amounted to 86,524,500 bbl., compared with 86,437,956 bbl. in 1914, an increase of 0.1%. The production was about 85,732,000 bbl., compared with 88,230,170 bbl. in 1914, a decrease of 2.8%. The stocks of finished cement at the mills were about 11,583,000 bbl., compared with 12,893,863 bbl. in 1914, a decrease of 10.2%. The slight decrease in production and the considerable decrease in stock indicate greater caution among the manufacturers who in the preceding few years showed a tendency toward overproduction, causing large additions to stocks.

The Pacific Coast district showed shipments of 5,867,000 bbl., production of 5,712,000 bbl., and stocks of 880,000 bbl., or decrease of 16.8%, 19%, and 11%, respectively.

In Colorado, Utah, Montana, and western Texas the shipments were 2,475,000 bbl., the production 2,525,000 bbl., and the stocks 300,000 bbl., decreases of 10.2% and 6.4%, and an increase of 42.5%, compared with 1914.

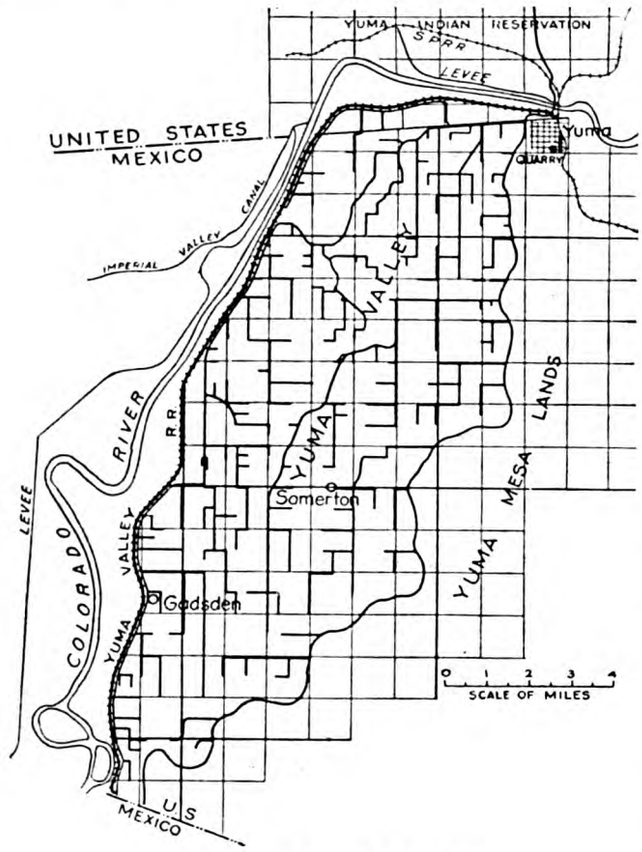
Prices in general were a few cents lower per barrel in 1915 than in 1914, although toward the end of the year they were considerably higher. The statistics show that the general volume of business was about the same as in 1914, although it was not uniformly distributed throughout the year. During the early part of the year the demand for cement was not great. In some districts the industry was depressed during the summer by excessive rainfall. In the last four months or more a decided change for the better has occurred both in demand and prices, so that the outlook for 1916 is brighter than it has been for several seasons.

Secondary triangulation from the Straits of Juan de Fuca to Grays Harbor is described in the annual report of the United States Coast and Geodetic Survey. The length of the arc was 110 miles and there were 16 stations in the main scheme. In much of the area traversed there were no trails, and the dense growth of timber and brush made progress almost as difficult as in a tropical jungle. Owing to the character of the country, it was impracticable to clear lines through the timber between stations. It was therefore necessary to elevate the instrument and heliotropes and lamps above the timber. The lumber used for this purpose was cut in the forest in the vicinity of the stations. In many cases, trees were pulled together to make supports. Several of these stations were over 100 ft. above the ground. In one case a tree used to support the lamp and heliotrope was sawed off 213 ft. above the ground. The tower in this case was a single tree, cleared of limbs.

Generated on 2024-09-30 01:12 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

THE YUMA VALLEY RAILROAD

The construction and operation of the Government-operated railroad from Yuma, Arizona, southerly through the Yuma valley to the Mexican boundary is described in the *Reclamation Record* by L. M. Lawson, manager of the Yuma project of the United States Reclamation Service. There are 23½ miles of main line. The Yuma valley, which includes one of the important units of the Yuma project, was subject to annual overflow by the Colorado river. One of the first pieces of construction on the project was the building of a portion of the Yuma Valley levee to protect this valley



MAP OF YUMA VALLEY RAILROAD.

land from the river overflow. The levee was originally placed to insure at least four or five hundred feet of land intervening between the dike and the river. From time to time the river has encroached on the land as far as the base of the levee. Attempts to prevent its further erosion with spur dikes and brush mats were finally abandoned and rock revetment substituted. This could be placed economically only by the use of a track laid upon the levee.

Efforts were made to interest the Southern Pacific Co. in a railroad through the Yuma valley, but on account of the improbability of its paying expenses neither this company nor any other interests could be persuaded to construct the railroad. In the early part of 1914 a board of engineers recommended the immediate construction of a railroad for river-front protection work, using the levee as a roadbed. Ground was broken for the Yuma Valley Railroad on April 6, 1914, and after considerable difficulty in obtaining that necessary right-of-way to connect with the Southern Pacific tracks, the first spike was driven on May 1, 1914. Twelve and one-half miles of railroad was constructed during the month of May and the dumping of rock for the revetment began on that date. The annual summer flood of 1914 attacked the bank between the 12 and 14-mile posts, interfering with the laying of track. This flood reached a maximum of 136,000 second-feet. In 12 hours as much as 300 feet of bank was eroded for a distance of half a mile. Several shoo-fly levees were constructed at this point to prevent overflow, and the track was laid on one of these and connected with the main levee below. Construction was finally completed to the boundary line in February, 1915.

A McKeen motor car operated by a gas engine was purchased in December, 1914. This has a carrying capacity of 70 passengers. Daily trips are made to the boundary and way stations. While the passenger traffic has been light, the freight shipments are considerable and are increasing in volume. The main reason, however, for the operation and maintenance of this railroad is the revetment work. This is as yet incomplete and will no doubt require some maintenance work each year. More than 300,000 tons of rock for revetment has been handled since the road was completed. Under a contract with the Southern Pacific Co. for the joint operation of track at Yuma, carload shipments destined for Yuma Valley points are received by the Reclamation Service and carried on its line, with charges regulated by the Interstate Commerce Commission.

Municipal ownership of water systems prevails in 155 of the 204 cities in the United States of over 30,000 inhabitants, the total estimated value of which is $1,071,000,000. Municipal ownership in this field has been in force in Philadelphia for a longer period than in any other city. The water supply for most cities comes from lakes and streams, but there are 3634 wells in operation in 47 cities. Of these, 1367 are in New York city alone. Five processes of purification are employed, namely, sedimentation, coagulation, slow sand-filtration, mechanical filtration, and chemical sterilization.

Of the total area of 753,420,800 acres in the 11 Western States of Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming, 305,397,887 acres are private and state lands, 132,311,090 acres are included in national forests, 41,664,873 acres in other reservations, and 274,046,950 acres remain open to entry. Of the land remaining open to entry about 14,800,000 acres will be required to satisfy the remaining land grants to the States.

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Class Rates and Rate-Making

The Best Control of Public Utilities*

It may be stated as an axiom that the best control of a public utility is that which develops an eagerness and ability on the part of the company to furnish the service and an equal eagerness and ability on the part of the consumer to purchase the service.

Class rates are absolutely necessary for the best development of business, but the same rates should apply in the same class regardless of geographical situation or of local conditions at the different points where the rates are fixed. For example: residence lighting should have the same rates in San Francisco, Sacramento, Marysville, etc.

There is confusion in the minds of consumers because rates for power are lower than rates for electric lighting, the energy for the two different kinds of service being measured in the same units. In the similar case of railway service, there is no feeling that passengers should be carried as cheaply as freight, because it is realized that the two kinds of service are different. One is measured in passenger-miles and the other in ton-miles. Therefore, class rates for electric service are more scientific than the methods in general use at present, and less likely to lead to misunderstandings. Examples from railway trans-continental freight charges may be cited in support of these contentions. Class rates for different classes of service should be based more on the cost of production to the public utility than on the value of the service to the consumer.

Discussion of Above Paper†

By A. H. BABCOCK‡

The paper is an argument for class rates in charging for electric service. For example, one set of class rates to apply to an entire power-distribution system, regardless of local, competitive, or geographical considerations; the rates in the different classes to be determined by, first, demand charges, that is, interest, maintenance, depreciation, operation and management; and, second, energy charges, which shall include only those items that are proportional to the kilowatt-hour output of the plant. The paper makes no attempt to determine the rates for the different classes, but is merely an argument in favor of class rates. In support of these arguments the author cites the different conditions under which passenger and freight rates are determined by a railroad company. He states that because of the great natural difference in the service rendered there is no confusion on the part of the public with reference to the justice or the equity in the differences found between those two generic classes of rates.

The author ignores the existence of different class rates for freight transportation, and he appears to overlook the significant underlying reasons for the great variations in freight classification and rates. Apparently he bases his arguments for power rates on the hypothesis that certain capitalists have certain capital to be invested for profit in a power-transmission and distribution system; and that by some means or other a profit must be secured on this investment, whether or not the particular locality to be served is ready for such development, and willing to receive it, or whether the plant is to be, or, in the case of an existing plant, has been designed with due regard for the natural economies in engineering and construction. It would seem that a far more just determination of such class rates, and a much stronger presentation of the necessity for such class rates, might have been advanced if the author had stated some of the principles upon which freight classification is determined and the rate for the transportation thereof fixed.

In the first place, a freight rate is a price charged for changing the position of something, just as a manufacturer's rate, whether he manufactures goods for sale or power for sale, is a price charged for changing the form of something. For useful purposes we must have things in the place they can be used, as well as in the form they can be used. Whoever changes either the form or the place in this connection adds value to the article, and is entitled to a profit for so doing. The power company in generating and distributing electricity does not change the energy itself, but merely changes the form thereof; that is to say, water falling down hill, or oil burned under a boiler, is converted from mechanical or chemical into electrical energy; and he changes the location of the energy by making it available for use at the point where the consumer desires to use it. Now, the consumer is not concerned in any way with the expense of making these transformations; he is concerned with only one thing, namely, the value of the energy to him at the point of consumption, and the value added to the energy in bringing it from the unusable form at the wrong place to a usable form in the right place is what determines the value of the service rendered by the public utilities. The value of this service, not the cost of it, is the true measure of the price to be charged for it.

Assume for the sake of argument that all electric power was generated as a by-product from some other and major operation, the Los Angeles aqueduct for example. This power is not valuable in any sense, that is

*Abstract of paper presented before the American Institute of Electrical Engineers January 22, 1915, by Frank G. Baum, consulting engineer, San Francisco.

†From the Proceedings of the American Institute of Electrical Engineers for January 1916.

‡Consulting electrical engineer, Flood Bdg., San Francisco.

Generated on 2024-09-30 01:15 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

to say, it is not usable by the manufacturer. It is not valuable to him personally merely because he cannot use it, but, if he can transport it to places where it can be used, and supply it there in the form desired by different people, the value of his service and the price that he can charge for it are determined by its value and usefulness to the consumer. It is worth a certain amount to a railroad company for transportation, both of passengers and freight. It is worth a different amount to a chemical works where the load is constant throughout the 24 hours. It is worth a different figure to a lighting-consumer, and worth still another figure to a small power-consumer. If the author were connected with a public utility supplying power in Los Angeles, where the aqueduct by-product is available, would selling prices, in competition with him, based on the cost of service, appeal to him? The manufacturer of this by-product can sell only at the price or prices that will develop "eagerness and ability on the part of the consumer to purchase" his by-product, or he cannot sell it at all. In other words, the cost of the service does not enter at all into the determination of the rates he can charge. This principle is sometimes called charging 'what the traffic will bear,' but it is not; it is charging what the traffic can afford; and the difference between the two statements is easily ascertainable. It is said, for example, that a Chinaman in making a bargain endeavors always to make all the profit, and he grieves if he finds that his adversary has made any profit, for then he argues that the other party to the agreement having made a profit, he himself must have made a loss. On the other hand, what the traffic can afford is just enough less than what that service is reasonably worth, so that a profit is left to the purchaser of the commodity; in which event, if a profit is still left to the manufacturer, men and capital will be induced to undertake such enterprises. If this profit to the manufacturer is not left, then the market is not yet ready for the enterprise.

To take another illustration of the fallacy of basing rates exclusively on the cost of service: As a part of the original development of the Standard Electric Co., it was proposed to utilize the tail water from Electra for irrigation purposes in the Sacramento valley. Assume now that a company with capital sufficient for the enterprise could build such an irrigating system, legally, without interference with other water users along the Mokelumne river, and that this company should approach the author with a proposition to purchase the Electra tail water, by a diversion at the tail race, with no cost to the author's clients. Would he recommend a sale of this water at the cost of service, or would he endeavor to estimate how much water the irrigation company could sell, at what prices the farmers could afford to purchase, what would be the overhead expense of the irrigation company; in short, would he endeavor to find how much this particular water traffic could afford? The answer is so easy that further discussion of it would be puerile. But the author of the paper contends that rates should be based on the cost of service plus a profit. If so, what cost, it is proper to inquire.

There are at least two ways of thinking of the cost of a service; first, that used by the author, which includes the demand charges and the energy charges, and therefore the entire cost; the second is the cost of those items that vary directly with the output of the plant, which is sometimes called the additional cost, or, to borrow a term from Acworth, the railroad economist, the 'out of pocket' expense. The application of these two costs to the science, or art, as perhaps it is better called, of rate-making, can be easily seen by considering the well known case of an established industry— a power-generating and distributing system, for example—which is serving a given territory. The cost of operation of this system would be covered by what is stated above as the entire cost. Let us assume, then, that as usual there is a large depression in the load curve during certain hours of the day, and that fortuitously a large consumer is found whose requirements for power will just about fill up this big depression. Obviously to serve this consumer requires no more overhead expense, the fixed charges are not appreciably increased, and the only expense to the manufacturer by reason of this additional load is for those items of his operating expense which vary with the kilowatt-hour output of the plant. This is the additional cost. Now, if the rate to this consumer is to be based on the cost of service, shall it be based on the entire cost per kilowatt-hour output of the plant, or shall it be based on the additional cost per kilowatt-hour covering this period of depression in the load curve? If the power company encourages the purchase of such power and, finding the business attractive, sells at the additional cost, will it not be accused of discrimination, and does it not stir up trouble for itself, the public arguing without discernment that if the power company can sell at this very low rate to one, it can equally well afford to sell at the same rate to all its consumers? In other words, will the public not demand that these same rates shall serve as the basis for all rate making. Precisely the same argument applies to extensions from an existing plant into territory not now served, where the market is limited at the present time, but where it may be expected to develop under proper treatment. As a matter of fact the rates the power company will charge for such service may be a normal power rate, having the entire cost of the plant as its basis; or it may be a sub-normal rate, having only the additional cost of service as its basis. The particular rate that will be chosen to cover such cases will depend on the value of the service to him who buys it. The additional cost evidently is the danger line below which an over-ambitious salesman must not drop under any conditions. Under certain conditions it may not be prudent to go even below the entire cost because of the tendency of the public to require comparison of rates regardless of conditions, and the danger that the regulating bodies may be compelled by political considerations to force rates elsewhere on the sub-normal basis when the normal rates are clearly justifiable. This con-

Generated on 2024-09-30 01:10 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

sideration may often deter an enterprise from developing new territory.

Certain communities by reason of position convenient to either low-cost fuel-supply, or to an abundant hydro-development, are so situated that only by quoting on the basis of the additional cost can attractive rates be made. It is evident here that the value of the service to the customer is what fixes the rate, and equally evident that this community is entitled to the lower rate its advantageous position secures to it. It is also evident that a power-transmission system supplying this community should be entitled to take business at the sub-normal rate of additional cost only, without being compelled unjustly to spread these same rates over its entire output regardless of local conditions. This argument alone, seems to dispose effectually of the author's contention for identical rates for a given class of service regardless of geographical position. It is unjust to expect the lighting rate shall be the same, for example, in all of the towns he has cited, any more than that the lighting and power rates should be identical in that same town, regardless of the different uses to which the energy is put, and consequently of the different values to the different customers. Power rates, then, to be reasonable can no more be the same for the same service in different localities than can trans-continental freight rates from the Atlantic coast to Salt Lake be as low as to San Francisco, and for precisely the same reasons. Community of interest, plus the natural physical advantages of one locality over another, is what causes bees to swarm, and men to congregate in cities. Such natural advantages are as immune to artificial or legislative interference as are the phases of the moon.

Furthermore, the attempt to base power rates on the cost of service has been, in the opinion of many persons, the direct cause of much legislation against legitimate enterprises, they suffering with the illegitimate ones, which, by combination of large blocks of water in the securities, have rolled up enormous fixed charges that have been assessed against the communities served. We have only ourselves to blame for much of the popular misunderstandings and hard feeling directed against us.

The author's paper is not an argument for any specific rates, but merely for the establishment of classes for rates to hold over the entire system. It is not proper, then, at this time to bring about a discussion of what constitutes reasonable rates under varying conditions, but in any such discussion and bearing directly upon it much can be learned by a study of the method of making freight classifications and freight rates as applied by the railroads. In considering this statement it should be remembered that the railroad industry is much older than the power industry; that the art of rate making is the result of several generations of hard study and earnest efforts; and that the principles underlying the determination of power or freight rates must be the same, because they deal with the same thing, namely, the value added to something by changing its form or changing its location.

Based on this argument, it would seem that the author's plea for class rates is just, for the reason that any average rate that might be considered fair would limit the use of electric power in many manufacturing establishments, because it would be too high; that is to say, the assumed value would not be the value to the consumer; while on the other hand, it would be much lower than the value of the same product to other consumers. It is not practicable to go to the other extreme, and make a special rate for every individual consumer; but it is possible to divide all consumers into certain classes. They may be more or less in number than the author has chosen, but within a class a rate must be given that will encourage the use of electricity in that class, not only in the manufacture of those articles to which the use of electric power will add the most, but also to which it will add the least in value; the latter class being the one that will fix the rates to all kinds of manufacturing in that class (the word manufacturing being here used in the broad sense). In fixing the rate for any given class the power company will sometimes be obliged to put its rate below the entire cost and yet not so low as the additional cost, the result being a sub-normal rate, less than reasonable, but necessary on account of the conditions surrounding the enterprise, and justifiable only under those conditions. Under other conditions at the other end of the scale there will be found cases where the value of the service is sufficiently great, and the rate may exceed the entire cost of service, in which case it is a normal and a reasonable rate, fair and just to all concerned, although it may be higher than the rate for some other class of service, or even for the same class of service under other conditions.

These are precisely the conditions that determine the particular rate charged for freight haulage by the railroads. The arguments advanced herein, far from being original, are largely paraphrased from an admirable paper on the railroad-rate question recently printed and distributed by the *Railway Age Gazette*. They are given here in the hope that some of those who question their equity in freight-rate making, but who understand them in power-rate making, will come to see the close analogy between the two, and therefore will be able to judge justly; and to see, that after all is said and done, the public utilities are all in one big family, and that it is as much our duty, as officials of such companies, to meet and to discuss just such problems as these as to argue our engineering problems. We owe it to ourselves as well as to our employers to do our part, every one in his own field, to bring about a better understanding by the public of all the conditions by which we come into contact with that public.

Long-distance transportation of hot asphalt was tried with success recently at Selma, California. The job was too small to make it worth while to erect even a small mixing-plant, so the asphalt was heated at Fresno, 15 miles away, loaded into special non-conducting containers, and brought to the work by train.

Generated on 2024-09-30 01:13 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

METHODS AND COSTS OF STREET CLEANING

The importance of selecting a pavement that can be cleaned at a low cost as well as one that can be repaired economically, was emphasized by Gus. H. Hanna, commissioner of street cleaning for Cleveland, Ohio, in an address before the Worcester Road Congress. From the street cleaner's standpoint, the two most important qualities in a pavement are smoothness and ease of removing particles from the surface. Bituminous pavements are deficient in the second quality and consequently are harder to keep clean than brick and stone pavement well-laid with a cement-grout filler. In Cleveland there is some brick pavement that was constructed ten years ago but is still in good condition. This pavement is usually cleaned five times a week at a cost of 15c. per 10,000 sq. ft. per cleaning. This is the cheapest pavement to clean.

Cleaning the best asphalt pavement costs 20c. per 10,000 sq. ft. and this cost increases to 30c. when the surface becomes rough or wavy. A stone block pavement with tar filler costs 30c. per 10,000 sq. ft. when new, and this cost increases to 60c. as the filler disappears and the joints roughen. In a new creosoted wood-block pavement the oil works out of the pores of the wood, requiring the use of steel scrapers to remove the dirt. The cost of cleaning when new runs as high as $1 per 10,000 sq. ft. and it is frequently two years before the pavement can be cleaned for as little as 30c. per 10,000 square feet.

Taking two different types of pavement, one costing 15c. and the other 30c. per 10,000 sq. ft. per cleaning, and assuming a pavement 40 ft. wide, cleaned five times per week during 40 weeks of the year, there is a difference in favor of the more easily cleaned pavement of $3.15 per mile per cleaning, and $630 per mile per year. Where the cost runs as high as 60c. per 10,000 sq. ft., as it frequently does with the less durable pavements after being in use for some time, the difference is still more marked. In selecting a type of pavement for a given street, the cost of cleaning is as important as the cost of repairs.

Experience in Cleveland has led to the adoption as far as possible of flushing for street cleaning. Sprinkling is not effective as the water cannot be applied with sufficient force to wash the dirt into the gutters where it can be collected with brooms and shovels and removed. Both hand and mechanical sweeping raise a good deal of dust, which is unsanitary. Some hand sweeping is necessary during the day on business streets that must be clean all the time. The hand-sweeper is also needed on residence streets, collecting dirt that has been either flushed or blown into gutters. In general, however, flushing is to be preferred. Allowing for the necessary additional hand-work, flushing has been found to cost but little more than half as much as straight hand-sweeping.

Considerable trouble is experienced from mud being tracked on to pavements from unpaved streets. Paving policies should be carried out with a view to having a minimum number of unpaved approaches to existing pavements. Narrow pavements on country roads should be protected from overflow or tracking of mud that comes from adjacent portions of the same highway. Where half of a road is paved, care should be exercised to prevent the unpaved portion across the paved part. If the pavement is so narrow that teams must turn out at meeting-points, the berms should be covered with broken stone or cinders to prevent tracking mud on the pavement.

SAFETY ORDERS OF THE CALIFORNIA INDUSTRIAL ACCIDENT COMMISSION

A pamphlet has recently been issued by the California State Industrial Accident Commission containing general safety orders regarding machinery and industrial plants. Sections 51 to 72 of the Workmen's Compensation Act give the Accident Commission power to make and enforce safety orders, rules, and regulations. This Act went into effect January 1, 1914, but the commission preferred to move deliberately in the matter of safety orders, studying the general safety situation, and conferring with representatives of the various interests affected. The present orders which went into effect January 1, 1916, were prepared by two committees, one working in San Francisco and one in Los Angeles. These committees were composed of representatives from the employers' organizations, the labor-unions, the casualty companies, and the accident commission. After the orders had been prepared tentatively, public hearings were held at both places, and various suggested changes considered. It is believed that the orders as promulgated have the approval of all parties affected.

The present orders cover safety precautions to be observed for gears, belts, pulleys, clutches, belt-shifters, shafting, set-screws, sprockets, fly-wheels of machines, grinding wheels, ladders, stairways, platforms, runways, swinging doors, passages, keys and key-seats, floor openings, hoistways, and conveyors. Orders regarding stationary engines are now in preparation. The orders are of such a character that their importance is self-evident.

Considerable discretion is given to the commission in the interpretation of the provisions of the orders. Its powers in these matters are similar to those of the Railroad Commission, being subject to a court review only. Failure to comply with safety provisions of the statute is a misdemeanor, and punishable as such. Failure to comply with the orders of the Commission makes a case against the violator which must be met by him by proving his place of employment to be safe.

A remarkable record for oil-pipe line construction was recently made on a line for the General Pipe Line Co. between the North Midway and Lost Hills in Kern county, California. In one day approximately 8360 lin. ft. of 8-in. pipe was laid, using a gang of 103 men. This included painting and covering with a protecting layer of paper.

Generated on 2024-09-30 01:18 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

tractor in a farming community. After discussing the value of silos and the reasons for building them of concrete, the author takes up the different methods of building them. There are a number of useful tables for the silo builder included. An index should have been included in the book.

THE PACIFIC COAST GOOD ROADS. Published by the Tri-State Good Roads Association, 542 Phelan Bdg., San Francisco. P. 102.

The annual review published by the Association contains much that is of value to those interested in highway construction. Probably the most important part of the volume is that containing the various addresses delivered at the Pan-American Road Congress in Oakland last September. There are also many contributed articles by Pacific Coast highway experts. Statistics regarding Pacific Coast streets and highways are included, together with considerable cost data.

MAINTENANCE OF WAY AND STRUCTURES. By William C. Willard. P. 424. Ill., index. McGraw-Hill Book, Co., Inc., New York. For sale by *Mining and Scientific Press*, San Francisco. Price, $4.

As a railroad system grows older, questions of new construction become of less, and questions of maintenance become of greater importance. Within the last few years a marked advance in maintenance standards and methods has been made throughout the United States. The present volume is the first to treat adequately of this advance. After discussing methods of organization of the maintenance department, the general subject of maintenance of way is attacked, commencing at the bottom with the roadbed, and continuing with ballast, ties, both wood and steel, rails, rail-joints, tie-plates, and other track fastenings. The stresses in the various parts of the track and roadbed are considered, and the design of the track. Fences, buildings, and other track accessories are discussed, as well as switches and turnouts. A chapter is then devoted to the work, both regular and seasonal, of the maintenance department. The various tools and machines used on the work are considered. The latter part of the book is devoted to records and accounts, with particular attention to the forms prescribed by the Interstate Commerce Commission. The book is well illustrated and there is an unusually complete index.

AMERICAN SEWERAGE PRACTICE. By Leonard Metcalf and Harrison P. Eddy. Volume III. Disposal of Sewage. P. 816. Ill., index. McGraw-Hill Co., Inc., New York. For sale by *Mining and Scientific Press*, San Francisco. Price, $6.

This is the concluding volume of the authors' treatise. Volume I, on the Design of Sewers was reviewed in WESTERN ENGINEERING for February, 1915, and Volume II on the Construction of Sewers was reviewed in March, 1915. The present volume commences with a brief historical review of the various methods of sewage treatment and disposal in various countries. The chemical and the bacteriological aspects of sewage are then considered, including both harmless and pathogenic bacteria. Plankton and other algae are discussed. The next chapter deals with the composition of sewage, showing the difference in this respect between the United States and European countries, as well as the effect of industrial wastes upon sewage. The next chapter reviews the various methods of sewage disposal and treatment, which are later taken up in detail under the headings of dilution, grit chambers, screens, sedimentation, chemical precipitation, contact beds, trickling filters, intermittent sand-filtration, and septic tanks. Under septic tanks, attention is called to the increasing use of the Imhoff tank. The disposal of sludge is discussed. The agricultural value of sewage and sewage-sludge is considered, with the conclusion that it has been much overrated. Other chapters deal with automatic apparatus for dosing filters, the disinfection of sewage and sewage effluents, and the disposal of residential and institutional sewage. The appendix contains some useful conversion tables.

ELEMENTS OF HIGHWAY ENGINEERING. By Arthur H. Blanchard. P. 497. Ill., index. John Wiley & Sons, Inc., New York. For sale by *Mining and Scientific Press*, San Francisco. Price, $3.

The universal increase of motor traffic and the use of highways in general has revolutionized highway engineering. Probably in no other branch of engineering are the treatises of twenty years ago so obsolete as in highway engineering. While the present volume is intended primarily for a class-room textbook, it will be found of value to all those interested in the subject. The first two chapters contain an historical review and a discussion of the methods of highway management in various parts of the world. Preliminary investigation, surveys, and design are then considered. The next chapter deals with grading, drainage, and foundations. The various types of highways are then discussed in order, including earth, sand, clay, gravel, water-bound macadam, bituminous-macadam, bituminous-concrete, sheet-asphalt, cement-concrete, wood-block, brick, and stone-block roads. The use of oil and other dust-preventatives is also considered, and the comparative merits of the various types of pavements. A chapter is devoted to street cleaning and snow-removal. Sidewalks, curbs, and gutters, are also discussed, as well as highway structures, including bridges, culverts, and street-railway tracks. Appendices contain a glossary of terms as adopted by various technical societies and a list of tests for highway materials.

EXAMPLES IN MAGNETISM. By F. E. Austin. P. 90. Ill., index. Hanover, New Hampshire, 1916. For sale by *Mining and Scientific Press*, San Francisco. Price, $1.10.

Professor Austin is certainly prolific, as this is the fourth book of kindred subjects that we have reviewed recently. This one is for students in physics and engineering. The fundamentals of mechanics, solved examples, and how to apply the results in practice are given. The printing is in green ink, and is not too well done.

Engineering Societies and Conventions

IDAHO SOCIETY OF ENGINEERS. Ira F. Schaffner, secretary, Boise.

Los Angeles Section of AMERICAN SOCIETY OF MECHANICAL ENGINEERS. Ford W. Harris, secretary, 1029 Higgins building.

Los Angeles Section of AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Edward Woodbury, secretary, 255 East 3rd street.

OREGON SOCIETY OF ENGINEERS. Orrin E. Stanley, secretary, room 409, City Hall, Portland.

Portland Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. Charles McGonigle, president, care Western Sheet Metal Works.

Portland Section, AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Paul Lebenbaum, secretary, 45 Union Depot.

San Francisco Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. E. T. Thurston, Jr., secretary, Mechanics Institute building.

San Francisco Section of AMERICAN SOCIETY OF MECHANICAL ENGINEERS. F. W. Gay, secretary, care J. G. White & Co., Alaska Commercial building.

San Francisco Section of AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. A. G. Jones, secretary, 811 Rialto building.

Southern California Association of Members of AMERICAN SOCIETY OF CIVIL ENGINEERS. W. K. Barnard, secretary, 701 Central building, Los Angeles.

Generated on 2024-09-30 01:16 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Coming Conventions

NATIONAL LIME MANUFACTURERS' ASSOCIATION. Annual meeting, Cleveland, Ohio, first week in February, 1916.

NATIONAL CONFERENCE ON CONCRETE ROAD BUILDING. Chicago, Illinois, February 15-18. J. P. Beck, secretary, 208 South La Salle street, Chicago, Illinois.

AMERICAN ROAD BUILDERS' ASSOCIATION. Annual Convention, Pittsburg, Pennsylvania, February 28 to March 3. E. L. Powers, secretary, 150 Nassau street, New York.

AMERICAN ELECTRIC RAILWAY ASSOCIATION. Midwinter meeting, Chicago, February 4. E. B. Burritt, secretary, 8 West 40th street, New York.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Midwinter meeting, New York, February 8-9. F. L. Hutchinson, secretary, 29 West 39th street, New York.

NINTH CHICAGO CEMENT SHOW. Chicago, February 12-19. R. F. Hall, secretary, 208 South La Salle street, Chicago.

AMERICAN CONCRETE INSTITUTE. Annual Convention, Chicago, February 14-17. John M. Goodell, 1418 Walnut street, Philadelphia.

AMERICAN INSTITUTE OF MINING ENGINEERS. Annual convention, New York, February 14-17. Bradley Stoughton, secretary, 29 West 39th street, New York.

AMERICAN CONCRETE PIPE ASSOCIATION. Annual convention, Chicago, February 17-18. E. S. Hanson, secretary, 528 South Clark street, Chicago.

INLAND WATERWAYS ASSOCIATION OF CALIFORNIA. Annual meeting, San Francisco, February 21-22. David H. Walker, secretary, 150 Pine street, San Francisco.

IDAHO SOCIETY OF ENGINEERS. Annual meeting, Burley, Idaho, February 21-23. Ira F. Shaffner, secretary, Boise.

NATIONAL ELECTRIC LIGHT ASSOCIATION. Annual convention, Chicago, week beginning May 22. T. C. Martin, secretary, 29 West 39th street, New York.

Personal

LELAND B. RAAB has been appointed city engineer of Tracy, California, succeeding J. HENRY SMITH, who resigned to take up engineering work in San Francisco.

ROSWELL H. JOHNSON, of the University of Pittsburg, delivered an address on the Conservation of Oil and Gas before the second Pan-American Scientific Congress at Washington.

The Supreme Court of Oregon has rendered a decision declaring that JOHN H. LEWIS state engineer, is also in charge of state highway work, in place of E. I. CANTINE, chief deputy engineer.

D. W. CHAMBERLAIN, who has been connected with the engineering department of the California state highway commission for several years, has resigned to take the position of engineer for the El Paso County, Texas, highway commission.

The Southern California Association of Members of the American Society of Civil Engineers has elected the following officers: president, WILLIAM MULHOLLAND; first vice-president, H. HAWGOOD; second vice-president, LOUIS C. HILL; W. K. BARNARD, secretary; and CHARLES H. LEE, treasurer.

SIDNEY B. WILLIAMSON, chief of construction for the United States Reclamation Service, has handed in his resignation, to take effect March 1, when he will leave for Chile to take charge of construction work for the American Smelting & Refining Co. B. H. BALDWIN, assistant chief of construction for the Reclamation Service, will have charge of the work until a new chief of construction is appointed.

Obituary

GRENVILLE M. DODGE, civil war veteran, and later chief engineer of the Union Pacific railroad during its original construction, died January 3, at his home in Council Bluffs, Iowa.

LOREN E. HUNT, assistant city engineer of San Francisco, died January 9 at his home in this city. He was a graduate of the University of California and was for some time an instructor at that institution. He was also engaged in engineering work around the Bay, and was appointed assistant city engineer of San Francisco on several different occasions.

RICHARD R. REIBENSTEIN, mayor of Stockton and for many years a building contractor in that vicinity, died January 12 at his home in Stockton. At different times he held the offices of public administrator, councilman, superintendent of streets, and member of the board of education. He was first elected mayor in 1889, serving one term, and was elected again in 1909, holding the office until his death. He was instrumental in the adoption of the present commission form of government of the city in 1912.

Commercial Paragraphs

THE MARTIN ROCKING FIFTH WHEEL CO. has taken over the business and patent right of C. H. Martin, of Springfield, Massachusetts.

THE PELTON WATER WHEEL CO. has recently published a pamphlet on the information required for an analysis of a proposed water-power development.

THE NATIONAL TANK & PIPE CO. of Portland is supplying over 100,000 lin. ft. of wood-stave pipe for the new water-supply system at Warrenton, Flavel, Fort Stevens, Gearhart, and Seaside, Oregon.

Benjamin W. Lawrence has purchased the Pelton-Doble water-wheel and the Pelton Francis turbine which were exhibited by the PELTON WATER WHEEL CO. at the Panama-Pacific Exposition and presented them to the Columbia School of Mines.

THE OTIS ELEVATOR CO. has recently completed a passenger elevator at Oregon City, Oregon, to handle traffic between the level of the railway track and a higher terrace upon which most of the city is situated. A steel tower was erected to form a hatchway in which the car of the elevator travels.

Catalogues Received

AMERICAN VANADIUM FACTS. American Vanadium Co., Pittsburg, Pa. P. 12. Ill. Discusses the various applications for vanadium steel.

YUBA BULLETIN. The Yuba Construction Co., San Francisco. P. 16. Ill. Describes the Yuba Ball-Tread tractor and gives various instances of its use.

THE WHALEN FORM. The Whalen Form Co., Syracuse, N. Y. P. 20. Ill. Describes the use of the Whalen form of culverts and gives considerable cost data.

BULLETIN No. 1632. The Allis-Chalmers Manufacturing Co., Milwaukee, Wisconsin. Describes the centrifugal pumps and pumping units manufactured by the company.

THE TERRY TURBINE. The Terry Steam Turbine Co., Hartford, Connecticut. P. 8. Ill. Gives a general description of the various turbine applications, and dealing particularly with various kinds of high, low and mixed pressure turbines.

STEAM TABLES FOR CONDENSER WORK, AND PYSCHOMETRIC TABLES FOR COOLING-TOWER WORK. The Wheeler Condenser & Engineering Co., Carteret, New Jersey. Each of these books contains a number of useful tables as indicated by their titles.

Generated on 2024-09-30 01:20 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Western Engineering

WEEKLY NEWS BULLETIN

WESTERN ENGINEERING *with* WEEKLY NEWS BULLETIN
$4.50 per Year

SAN FRANCISCO, JANUARY 31, 1916

SINGLE COPIES WEEKLY NEWS BULLETIN
15 Cents

Construction Summary

During the past month engineering construction of all kinds has been delayed by adverse weather conditions throughout the Pacific Coast, and the principal work in these lines has been toward the maintenance of existing structures, and for temporary replacement of structures destroyed by the storms. The geatest damage has been in southern California and Arizona, the railroads being the principal sufferers. A number of bridges have been wrecked or seriously weakened and a good deal of roadbed has been washed out. Traffic has been suspended several times during the month for short periods, in the South on account of washouts and in the Sierras and Siskiyous because of heavy snowfall and landslides. Highways also suffered considerably, but the concrete roads built by the California State Highway Commission and by some of the counties in California and elsewhere have in many cases stood the test of having water flow over them for several hours without appreciable damage. The levees on the Colorado river broke near Yuma flooding the city and a large part of the Yuma valley. As soon as the weather becomes more settled there will be a great deal of work replacing temporary repairs with permanent construction. A heavy gale destroyed 400 derricks and considerable other property in the Midway and McKittrick oilfields, causing a heavy demand for lumber and skilled carpenters, and also an influx of more unskilled laborers than could be employed. Some damage was done by overflow in the interior valley of California but in general the rivers carried their burden of flood-waters surprisingly well.

In the Sacramento River drainage basin this was largely due to the dredging now being carried on by the Federal Government on the channel between Rio Vista and Collinsville. During the month of December the two suction dredges at work there removed 747,854 cu. yd. of material. During November these dredges also completed cut-offs 'B' and 'C' on the San Joaquin river, which materially relieved flood conditions in that region. On account of weather conditions, the Yolo causeway on the State highway connecting Sacramento and San Francisco will probably not be open for traffic on Febrauary 1 as was originally expected. A similar delay is probable in the case of the San Diego & Arizona railroad, where it was expected that regular train service would be started between San Diego and Campo, 65 miles, at this time. Trains are now being operated as far as Division, 59 miles. On the eastern end track is laid from Seeley west to Carriso Gorge, 32 miles. From Seeley to El Centro, the Holton Interurban railroad will be used. The uncompleted portion from Campo to Carriso Gorge, 32 miles, will require much heavy construction.

Plans are already under way for considerable State highway construction in Washington. Contracts for $133,000 worth of work, including 46 miles of highway and four reinforced concrete bridges have recently been awarded. The Willamette Pacific railroad, a subsidiary of the Southern Pacific Co., running from Eugene to Coos Bay, Oregon, is nearly completed. It is reported that this road will be extended along the coast from Coos Bay to Trinidad, California, about 225 miles, connecting with the Northwestern Pacific railroad at this point and providing a new through line between Portland and San Francisco. The north jetty at Grays Harbor, Washington, has been completed by the Federal Government after four years of work and an expenditure of $2,200,000.

Contracts Pending

Bids will be Received		See Issue of News Bulletin
Jan. 31.	Los Angeles, Cal., Sewers	Feb. W. E.
Jan. 31.	Newport Beach, Cal., Gas System	Feb. W. E.
Jan. 31.	Portland, Ore., Building	Jan. 17
Jan. 31.	San Bernardino, Cal., Building	Jan. 17
Jan. 31.	San Francisco, Cal., Repairing Tender	Jan. 24
Jan. 31.	Venice, Cal., Street Work	Feb. W. E.
Feb. 1.	Phoenix, Ariz., Street Work	Feb. W. E.
Feb. 1.	Pocatello, Ida., Headgates	Feb. W. E.
Feb. 1.	Stockton, Cal., Street Work	Feb. W. E.
Feb. 2.	Denver, Colo., Cement	Feb. W. E.
Feb. 3.	Arcadia, Cal., Water Meters	Feb. W. E.
Feb. 3.	Portland, Ore., Heating System	Feb. W. E.
Feb. 3.	Ventura, Cal., Bridge	Jan. 24
Feb. 4.	Ventura, Cal., Road Work	Jan. 24
Feb. 7.	Bakersfield, Cal., Road Oil	Jan. 17
Feb. 7.	Berkeley, Cal., Heating System	Feb. W. E.
Feb. 7.	Corvallis, Ore., Building	Feb. W. E.
Feb. 7.	Hanford, Cal., Asphaltum	Feb. W. E.
Feb. 7.	Port Angeles, Wash., Bridge	Jan. 17
Feb. 7.	Santa Ana, Cal., Misc. Pipe, Etc.	Feb. W. E.
Feb. 7.	Santa Barbara, Cal., Concrete Bridge	Jan. 24
Feb. 7.	Santa Barbara, Cal., Fencing Highway	Jan. 24
Feb. 7.	Santa Barbara, Cal., Five Bridges	Jan. 24
Feb. 7.	San Jose, Cal., Fuel Oil	Jan. 17
Feb. 7.	Seattle, Wash, Road Work	Jan. 17
Feb. 7.	Sydney, Australia, Pumps and Motors	Jan. 24
Feb. 7.	Ventura, Cal., Cement and Road Materials	Jan. 24
Feb. 8.	Bakersfield, Cal., Road Work	Jan. 17
Feb. 8.	Modesto, Cal., Concrete Pipe Drain	Jan. 24
Feb. 8.	Pasadena, Cal., Feed Regulators	Feb. W. E.
Feb. 8.	Sacramento, Cal., Waterworks	Feb. W. E.
Feb. 8.	St. Ingnatius, Mont., Concrete Canals	Jan. 17
Feb. 9.	Davenport, Wash., Street Work	Feb. W. E.
Feb. 9.	Seattle, Wash., Fire Protection	Feb. W. E.
Feb. 9.	South Bend, Wash., Street Work	Jan. 24
Feb. 9.	South Bend, Wash., Trestle	Jan. 24
Feb. 10.	Centerville, Utah, Misc. Pipe, Etc.	Feb. W. E.
Feb. 10.	Bakersfield, Cal., Road Grader	Jan. 17
Feb. 10.	Kamas, Utah, Misc. Pipe, Etc.	Feb. W. E.
Feb. 10.	Turlock, Cal., Building	Feb. W. E.
Feb. 11.	Portland. Ore., Repairing Dredge	Jan. 17
Feb. 11.	Seattle, Wash., Bridge	Jan. 17
Feb. 14.	Everett, Wash., Culverts	Jan. 17
Feb. 15.	Boise, Idaho, Building	Feb. W. E.
Feb. 15.	Seattle, Wash,. Bridge	Jan. 24
Feb. 15.	Washington, D. C., Stearing-Gear	Jan. 24
Feb. 16.	Sacramento, Cal., Building	Jan. 17
Feb. 16.	Seattle, Wash., Spillway Gates	Jan. 24
Feb. 17.	Los Angeles, Cal., Concrete Buildings	Jan. 24
Feb. 18.	Portland, Ore., Building Construction	Jan. 24
Feb. 21.	Astoria, Ore., Machinery	Feb. W. E.
Feb. 21.	Olympia, Wash., Road Work	Feb. W. E.
Feb. 21.	Portland, Ore., Stone	Feb. W. E.
Feb. 27.	Los Angeles, Cal., Excavation	Jan. 24
Mar. 1.	Colville, Wash., Water System	Feb. W. E.
Mar. 3.	Seattle, Wash., Concrete and Steel Bridge	Jan. 24

Generated on 2024-09-30 01:11 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Construction News

STREET AND ROAD WORK

Astoria, Ore.—City engineer G. C. McClean is preparing plans for 1100 sq. yd. brick pavement, 3200 sq. yd. asphalt pavement on 5-in. concrete base, 1500 lin. ft. concrete curbs, and 6300 sq. ft. concrete sidewalks. Bids will probably be received in March.

Davenport, Wash.—Bids will be received until February 9 by city clerk for grading and construction of macadam pavement on several streets. Estimated cost is $6000.

Globe, Ariz.—County engineer Thomas is preparing plans for paved highway from Globe to Miami. Call for bids will be issued about February 7. This is the first work to be done under the bond issue of $370,000 recently voted for construction of county highway system.

Lincoln, Cal.—Election will be called to vote on bond issue of $20,000 for construction of State highway through city limits.

Lindsay, Cal.—City engineer H. D. Watts is preparing plans for construction of 70,000 sq. ft. of asphaltic concrete pavement on bituminous base on Honolulu street.

Plans are being prepared for construction of five blocks of pavement on Main street.

Los Angeles, Cal.—Board of Public Works will receive bids until 10 a.m., January 31, for the following street work: bitulithic pavement and granite-block gutter on Cameron lane; curbs, sidewalks, and concrete gutter on Champlain terrace; bitulithic pavement, curbs, sidewalks, vitrified-brick gutter, and storm drains on Bellevue avenue; curbs, sidewalks, and vitrified-brick gutter on Boylston street; concrete pavement, grading, oiling, curbs, and sidewalks on Wadsworth street; grading and oiling, concrete gutter, drains, and sanitary sewer on Cromwell avenue and on several other streets; asphalt pavement, curbs, sidewalks, granite-block gutter, and storm sewer on Central avenue; asphalt pavement, curbs, and granite-block gutter on Carondelet street.

Olympia, Wash.—Bids will be received until February 14 by State Highway Commission for grading and draining ten miles of highway between Ellensburg and Vantage. Work includes 14,000 cu. yd. common excavation, 10,560 cu. yd. loose rock, 14,000 cu. yd. solid rock, and 1020 ft. concrete pipe.

State Highway Commission has awarded the following contracts for highway work: Grading and draining highway from Ritzville to Sprague, 23¾ miles, to Mitchell Bros., Spokane, for $31,961. There were six bidders in all. Engineers' estimate was $34,105. Clearing, grading, and draining 8½ miles of McClellan Pass highway from Greenwater to Summit, to Sloan Bros., Seattle, for $48,867. There were six bidders. Engineers' estimate was $50,723. Clearing, grading, and draining 13½ miles of Sunset highway from Easton to Cle Elum to General Construction Co., Mallon and Post streets, for $29,564. There were 13 bidders. Construction of four reinforced concrete arch-bridges to Security Bridge Co., Spokane, for $23,200. There were 21 bidders.

Date for receiving bids for grading and draining 10 miles of highway between Ellensburg and Vantage has been postponed by State Highway Commission to February 21.

Orofino, Ida.—City Council has decided to construct concrete pavement and sidewalks on four blocks of principal business street. Estimated cost is $12,000, which will be borne by the property-owners.

Phoenix, Ariz.—Bids will be received about February 1 by city clerk for grading and construction of pavement, curbs, gutters, and storm drains on several streets. Estimated cost is $200,000. Alternate bids will be received on the following types of pavement: bitulithic with cement concrete base, bitulithic with bituminous concrete base, bitulithic with no base, topeka top with cement concrete base, 'National' pavement, concrete pavement, 'Bitustone' pavement, tarvia-filled macadam pavement, and asphalt concrete with bituminous concrete base.

Portland, Ore.—Contract for construction of bitulithic pavement on Bybee avenue has been awarded to Oregon Independent Paving Co., 294 East Salmon street, for $9181.

Pacific Bridge Co., foot of Salmon street, was low bidder at $13,975.52 for construction of 790-ft. fill on extension of Union avenue.

Richmond, Cal.—City engineer H. D. Chapman is preparing plans for improvement of San Pablo avenue within city limits, about one mile, as part of the State highway.

Sacramento, Cal.—State highway engineer A. B. Fletcher has made the following statement regarding construction of State highway laterals in the mountain counties of northern California: Lateral should be run from Redding to Weaverville, 50 miles. Eighteen miles of this has been surveyed. Road from Redding to Alturas via Pit River canyon would cost $300,000 to $400,000 more than road via Hatchet Creek mountain, so the latter route is to be preferred in spite of snow troubles. Distance, 150 miles. Construction of highway from Downieville to Quincy and thence to Susanville, a total distance of 110 miles, is favored against construction of highway from Oroville to Quincy, 65 miles, and highway from Redding to Susanville, 100 miles, but this decision is not to be regarded as final. Final decision in this matter depends largely upon the wishes of residents. The construction of most if not all of the proposed highdays is dependent on the success of the proposed additional bond issue of $15,000,000 to be submitted to the voters this November.

Sausalito, Cal.—Contract for construction of concrete sidewalk on Water street has been awarded to John Mullany at 11⅞c. per square foot.

Salt Lake City, Utah.—City engineer S. Q. Cannon has prepared plans for proposed paving to be undertaken during 1916. Estimated cost of pavement is $608,155; of new water-mains, $62,815; and of lowering old mains, $7245.

San Diego, Cal.—Olaf Nelson was low bidder at $17,012 for grading and construction of curbs, sidewalks, and decomposed-granite pavement on streets in Ocean Beach. Other bidders were: A. N. Parker, $17,998; G. R. Daley, $18,468; Hyde Construction Co., $18,790; M. D. Goodbody, $19,320; Doran & Reed, $19,572; Jonas Hansson, 19,586.

Election will be called to vote on transfer of money from previous bond issues to fund for construction of concrete highway from Torrey Pines grade to Pacific Beach. Estimated cost of work is $90,000.

Bond issue of $2,000,000 for construction of county highway system is proposed. John F. Forward, 108 Ivy street, is interested.

Santa Ana, Cal.—Plans are being prepared for connection of highway systems of Orange and Los Angeles counties by construction of six miles of paved highway near Pomona.

Selma, Cal.—Plans are being prepared and bids will be called for soon for construction of one mile of paved highway through city. J. L. Campbell is superintendent of streets.

Stockton, Cal.—Bids will be received until 10:30 a.m., February 1, by G. W. Pulich, city clerk, for repair of asphalt pavement on several streets.

Venice, Cal.—Bids will be received until 4 p.m., January 31, by C. S. Thatcher, city clerk, for improving Venice boulevard.

Visalia, Cal.—Contract for construction of asphalt pavement on concrete base on Bridge street and Main street has been awarded to Federal Construction Co., Sharon Bdg., San Francisco, at 12.83c. per sq. ft.; curbs at 33c. per lin. ft.; and gutters at 18c. per lineal foot.

SEWERS AND DRAINAGE

El Centro, Cal.—Opening of bids for construction of joint sewage-disposal plant for cities of El Centro and Imperial has been postponed to February 9. Plans from Olmsted & Gillelen, 1112 Hollingsworth Bdg., Los Angeles, upon payment of $1.50. L. Northcott is city clerk.

Eugene, Ore.—Election will be held in April to vote on bond issue of $50,000 for construction of drainage system in Amazon Slough district.

Klamath Falls, Ore.—Plans are being prepared for reclamation of marsh land by U. S. Reclamation Service by construction of 32 miles of levee costing $97,790. D. J. Zumwalt is project engineer.

Los Angeles, Cal.—Board of Public Works will receive bids

Generated on 2024-09-30 01:16 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

until 10 a.m., January 31, for construction of sewers on Vine street, Fourth street, Rosewood avenue, Park drive, and Sierra street.

Board of Supervisors has appointed J. W. Reagan flood-control engineer, and has appropriated $60,000 for carrying on work of the department. Total estimated cost of proposed construction is $3,600,000.

Oak Harbor, Wash.—W. B. Lance, Northern Bank Bdg., Seattle, was low bidder at $17,338 in cash, or $18,628 in bonds of district for construction of diking system for district No. 3.

Oakland, Cal.—Contract for construction of sewer on Tompkins avenue has been awarded to Michael Heafey 2320 McKinley street, Berkeley, at $0.90 per lin. ft. for 8-in. sewer, $0.50 each for 5 by 8-in. wye branches, and $7.50 each for lamp-holes.

Pomona, Cal.—Citizens of Pomona, Claremont, San Dimas, and Lordsburg are considering plans for formation of flood-control district for protection from San Antonio wash. M. Maple, Palomares and Phillips streets, is interested.

Porterville, Cal.—Repair of levees and cleaning channel of Tule river to avert danger from high water is proposed. G. T. Ritchie is interested.

Portland, Ore.—Bids will be received until 11 a.m., February 21, at U. S. Engineer Office, 802 Couch Bdg., for furnishing stone for north jetty construction at mouth of Nehalem river.

Sacramento, Cal.—City engineer Miller has reported that cost of connecting sewer sump No. 1 with sump No. 2 would be $109,000. A 51-in. sewer would be needed.

Salt Lake City, Utah.—City engineer S. Q. Cannon has recommended that City Commission ask for bids for construction of outlet pipe for sewer from new pumping station to outlet sewer. Alternate bids will be asked on concrete pipe, vitrified clay pipe, and monolith reinforced concrete pipe.

Ventura, Cal.—Board of Supervisors has granted permission for formation of drainage district near Mound. C. W. Petit is engineer.

BRIDGES AND CULVERTS

Eugene, Ore.—War Department has granted permission for construction of drawbridge over north fork of Siuslaw river. Expense will probably be shared by county and Tide Water Milling company.

Everett, Wash.—All bids for construction of steel bridge over Pilchuck river have been rejected. Call will be issued for concrete bridge instead.

Modesto, Cal.—City will construct bridge on Eighth street over lateral four of irrigation district's system.

Portland, Ore.—Contract for construction of Union Avenue viaduct has been awarded to Giebisch & Joplin, Rothchild Bdg., for $33,098.20.

Walla Walla, Wash.—Contract for construction of two reinforced concrete bridges has been awarded to H. L. Wilson Co., for $6054. W. R. Rehorn is city engineer.

IRRIGATION AND WATER SUPPLY

Arcadia, Cal.—City clerk will receive bids until 8 p.m., February 3, for furnishing water meters.

Centerville, Utah.—Bids will be received until 7 p.m. February 10, by John F. Porter, city clerk, for furnishing materials for waterworks system, including 27,000 lin. ft. 4-in. wood-stave pipe, 1400 lin. ft. 8-in. wood-stave pipe, 3500 lin. ft. 6-in. wood-stave pipe, 18 fire hydrants, 4-in. opening, 6000 lb. cast-iron fittings, and several valves. Plans from town clerk or from Caldwell & Richards, 520 Vermont Bdg., Salt Lake City.

Colville, Wash.—Bids will be received by city clerk until March 1 for construction of water-system. Estimated cost is $20,000. Sawyer Bros., Lindelle Bdg., Spokane, are engineers.

Denver, Colo.—Vulcan Iron Works, Francisco and Kearny streets, San Francisco, was low bidder at $1425.80 for furnishing at Denver, 15 winches for Milk River project of U. S. Reclamation Service in Montana.

Eugene, Ore.—Commercial Club is investigating proposed irrigation project including 60,000 acres in Long Tom district. Estimated cost of work is $280,000.

Kamas, Utah.—Bids will be received until 7 p.m., February 10, by M. W. Lewis, city clerk, for furnishing materials for water-system as follows: 6690 lin. ft. of 6-in. wood-stave pipe, 24,105 lin. ft. of 4-in. wood-stave pipe, 4790 lin. ft. of 4-in. vitrified clay or concrete pipe, 5 fire hydrants, 4000 lb. cast-iron fittings, and a number of valves and specials. Plans from clerk or from Caldwell & Richards, 520 Vermont Bdg., Salt Lake City.

Lincoln, Cal.—Contract for furnishing 1360 ft. of 6-in. water-pipe to be laid on East avenue has been awarded to Sacramento Pipe Works, Sacramento.

Los Angeles, Cal.—Election in Hollywood district has resulted in bond issue of $1,200,000 being voted, $533,000 for purchase of existing systems and miscellaneous expenses, the remainder for new construction.

Madera, Cal.—Parties interested in proposed Madera irrigation district have applied to State Water Commission for permission to divert 5000 second-feet of water from San Joaquin river. L. M. McCardle is interested.

Montague, Cal.—A. L. Harlow will spend $100,000 in clearing and irrigating 5000 acres of land.

Murray, Utah.—Progress Co. will divert water from Big Cottonwood creek. Diversion dam and pipe-line 18,000 ft. long will be constructed. J. P. Cahoon is president.

Oakdale, Cal.—Contract for construction of Cape Horn tunnel has been awarded to James Willison of La Grange and Turlock for $56,780, instead of $70,000 as previously reported. Burton Smith is engineer. Contract for construction of Cometa lateral extension, Young and Leach laterals, and concrete structures on all the new work has also been awarded to Willison. Contract for West Pump extension has been awarded to J. R. Niman, Turlock. L. O. Hopkins, Turlock, was low bidder for construction of Swede, Adams No. 2, Howel, and Thompson laterals.

Pocatello, Ida.—Bids will be received until February 1 at office of Idaho irrigation district, Salisbury Earl Bdg., for construction of reinforced concrete head-gates, radial type at head of Boomer canal. Plans on file at office of Cotton & Wilson, 224 Salisbury Earl Building.

Porterville, Cal.—Contract for reconstruction of Sunnyside Water Co. has been awarded to J. A. Ulmer Machinery Co. Wells will be deepened and additional pumps installed.

Sacramento, Cal.—Irrigation district in Carmichael Colonies No. 1 and 2 was formed at election. District includes 3100 acres. Estimated cost of works is $52,000, which will be provided by bond issue to be submitted to voters soon. Albert Givan, Hagelstein Bdg. is engineer.

Bids will be received until 11 a.m., Febraury 8, by M. J. Desmond, city clerk, for construction of addition to city waterworks. Plans from city clerk, upon deposit of $2.50.

San Rafael, Cal.—No bids were received for $300,000 block of bonds of Marin Municipal water district. This is the second time these bonds have been offered for sale. District will bring suit to test constitutionality of act under which district was formed. In case the act is upheld, the entire $3,000,000 in bonds authorized will be placed on sale.

Santa Ana, Cal.—Bids will be received until 5 p.m., February 7, by E. L. Vegely, city clerk, for furnishing 5000 ft. of 6-in. class A cast-iron water-pipe and 15,000 ft. of 4-in. pipe.

Seal Beach, Cal.—Election will be called to vote on bond issue for purchase of water-system from Bayside Land Co., and for construction of sewer and electric-lighting system.

Seattle, Wash.—Bids will be received until 1:30 p.m., February 9, by C. E. Remsberg, secretary Port of Seattle Commission, for construction of water-supply and fire-protection system for Spokane Street transit shed, also for roofing the shed.

Plans are being prepared for concrete pipe-line from Landsburg to city reservoirs. Estimated cost, including an enlarged reservoir at Volunteer Park, is $3,000,000.

Contract for construction of pumping plant and water-mains for natatorium at 2nd avenue and Lenora street has been awarded to Gray & Barash, 316 First street, for $31,000.

Yreka, Cal.—A. L. Harlow has purchased holdings of Mt. Shasta Land & Irrigation Co. in Big Springs district; he will construct new power plant and ditches.

Generated on 2024-09-30 01:12 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

LIGHT, HEAT, AND POWER

Berkeley, Cal.—Bids will be received until 11 a.m., February 7, by office of Comptroller, University of California, for heating and ventilating and electric wiring of Benjamin Ide Wheeler Hall and for the granite work on the esplanade of the Jane K. Sather tower. Plans and specifications from Comptroller upon deposit of $50.

Hailey, Ida.—Property of Hailey Electric Light Co. has been purchased by Rockwell-White Power Co., which will spend $20,000 on improvements. E. W. Rising is manager.

Los Angeles, Cal.—Gas properties of Southern California Edison Co. in cities of Pomona, Long Beach, Venice, Santa Monica, San Pedro, San Dimas, Lordsburg, Ocean Park, and Claremont have been purchased by the Southern Counties Gas Co., Title Insurance Bdg., for between $3,000,000 and $4,000,000. Extensions will be made.

Newport Beach, Cal.—Bids will be received until 7:30 p.m., January 31, by L. S. Wilkinson, city clerk, for construction of municipal gas-distributing system, including 1500 ft. of 4-in. pipe, 8500 ft. of 3-in., 14,200 ft. of 2-in., 13,450 ft. of 1½-in., 10,000 ft. of ¾-in., 400 metres, and a number of valves and specials. I. B. Funk, 514 Central Bdg., Los Angeles, is city engineer.

Pasadena, Cal.—Bids will be received until 10 a.m., February 8, by H. Dyer, city clerk, for furnishing two automatic motor-operated induction feed-regulators.

Contract for installation of ornamental lighting system on Prospect boulevard has been awarded to C. C. Glass, 773 Earlham street, for $4980.

Portland, Ore.—Bids will be received until 4 p.m., February 3, by R. H. Thomas, school clerk, 401 Courthouse, for heating and ventilating Benson Polytechnic school. Plans from F. A. Naramore, 303 Courthours, upon deposit of $25.

Prairie City, Ore.—Prairie Power Co. has received permit from State Engineering Department for development of 953 hp. Plans include construction of two miles of canal, a reservoir, and a power-plant. Estimated cost is $45,000.

Seattle, Wash.—Bids will be received until February 3 by Board of Public Works for furnishing cable, junction-boxes, and other electrical equipment for court-house tunnel.

RAILROAD WORK

Salt Lake City, Utah.—Salt Lake & Utah Railroad will build line from Kirkham to Saratoga Springs, six miles. Boat line will also be established.

San Francisco, Cal.—Board of Supervisors has approved sale of Hetch-Hetchy bonds. This will provide funds for construction of Hetch-Hetchy railroad, contract for which has been already awarded to F. Rolandi.

State Railroad Commission has granted authority for construction of highway crossing over Southern Pacific tracks near Peyton. Estimated cost is $10,000, which will be divided between Contra Costa county and the company.

Contract for construction of Church Street railroad from 16th to 18th streets and from 22nd to 30th streets has been awarded to Western Motor Draying Co., 351 Noe street, for $57,455.93. Contract for furnishing trolley poles has been awarded to John Spargo, 240 Montgomery street, for $6590.

BUILDING CONSTRUCTION

Boise, Ida.—Bids will be received until 10 a.m., February 15, for erection of two-story county hospital building. Plans from Tourtelotte & Hammond.

Corvallis, Ore.—Bids will be received until 8 p.m., February 7, by N. R. Moore, secretary board of regents, Oregon Agricultural College, for construction of forestry building. Plans on file at office of college or at office of J. V. Bennes, Chamber of Commerce Bdg., Portland.

Eugene, Ore.—University of Oregon will construct building for school of education. Estimated cost is $40,000.

Idaho Falls, Ida.—Bond issue of $85,000 for construction of three school buildings has been voted.

Los Angeles, Cal.—Panama-Pacific Warehouse Corporation has applied to State Railroad Commission for permission to issue $450,000 in bonds for construction of six-story reinforced concrete warehouse. W. C. Cook, 503 Trust & Savings Bdg., is in charge of plans. Stone & Webster Engineering Corporation will probably be awarded contract.

Manhattan Beach, Cal.—Contract for construction of hollow tile and concrete municipal building has been awarded to W. M. Bell, 406 Ocean Front, Redondo Beach, for $12,625.

Modesto, Cal.—Construction of two school-houses costing $200,000 is proposed. Plans for one building are being prepared by Hewitt & Remer, Title Insurance Bdg., Los Angeles, and for the other by Stone & Wright, Stockton. Bond election will be called soon.

Olympia, Wash.—Bond issue of $1,500,000 for State capitol buildings have been sold and construction of temple of justice costing $150,000 will be started soon.

Salt Lake City, Utah.—Board of Education has recommended bond issue of $200,000 for construction of school buildings.

Santa Barbara, Cal.—The management of Arlington hotel will build reinforced concrete addition containing 100 rooms. E. P. Dunn is manager.

Seattle, Wash.—University of Washington will construct political science building. Building will be three-story, of reinforced concrete, and will cost $150,000. Bebb & Gould, Denny Bdg., are architects.

Turlock, Cal.—Bids will be received until 5 p.m., February 10, by city clerk, for construction of building for Carnegie library. Estimated cost is $10,000.

Walla Walla, Wash.—Bonds for construction of $139,000 high school and a $61,000 grammar school have been voted. Bids for the construction of these buildings will be received by the secretary of the school board until about the end of February.

Woodburn, Ore.—Contract for construction of $40,000 hollow-tile building for high-school has been awarded to E. B. White, Lumber Exchange Bdg., Portland.

Woodland, Cal.—W. H. Weeks, 75 Post street, San Francisco, is preparing plans for court-house. Estimated cost is $200,000. Work will be advertised in February or March.

MISCELLANEOUS

Astoria, Ore.—Bids will be received until February 21 by Port of Astoria, for elevating machinery, shafting, belting, etc., for new grain-elevator.

Denver, Colo.—Bids will be received until 10 a.m., February 2, at office of U. S. Reclamation Service, for furnishing from 13,000 to 20,000 barrels of cement, f.o.b. works of bidder.

Hanford, Cal.—Bids will be received until February 7 by Board of Supervisors for furnishing 11,000 tons asphaltum of 60 to 90 penetration.

Manhattan Beach, Cal.—Bond issue of $90,000 for construction of piers on waterfront has been voted.

Oakland, Cal.—J. D. Barnes Co., 175 Steuart street, San Francisco, is preparing to construct $600,000 shipbuilding plant on Oakland estuary.

Porterville, Cal.—H. S. Doyle will construct calcining plant for magnesite on South E street.

Sacramento, Cal.—Paul H. Norboe, assistant State engineer, estimates the cost of a canal 50 ft. wide on the bottom, excavated to 20 ft. below sea-level, from Sacramento to mouth of Sacramento river at $825,000. Length would be 35 miles.

San Francisco, Cal.—Union Iron Works has purchased Alameda plant of United Engineering Co. and will make extensions.

Contract for repairs to steamer 'Minnesota,' including removal of old boilers and installation of 16 new ones, has been awarded to Union Iron Works for about $400,000.

State Harbor Commission has prepared plans for reconstruction of pier No. 13 at foot of Vallejo street.

Seattle, Wash.—Bids will be received until January 31 at office of Alaska Engineering Commission, Bell Street dock, for furnishing the following supplies: 10 kegs of bolts, 19,000 exploder-caps, 400,000 lb. dynamite, 100,000 lb. black powder, 5 tons blacksmith coal, 300 ft. chain, 33,000 lb. drill-steel, and 53,000 ft. wire.

Venice, Cal.—Bids will be received until 4 p.m., January 31, by C. S. Thatcher, city clerk, for completing Center Street fishing-pier.

Generated on 2024-09-30 01:18 GMT / https://hdl.handle.net/2027/uiug.30112007838425
Public Domain, Google-digitized / http://www.hathitrust.org/access_use#pd-google
Digitized by Google
Original from UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN